

Revision of *Misumessus* (Thomisidae: Thomisinae: Misumenini), with observations on crab spider terminology

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Abstract. The widespread and previously monotypic genus *Misumessus* Banks, 1904 from North America is found to consist of at least seven species. The type species, *M. oblongus* (Keyserling, 1880), occurs from Ontario, Canada, to eastern Texas and ranges over most of the eastern and mideastern United States. *Misumessus lappi* sp. nov. has a midwestern range and is known from central Texas to eastern Colorado. *Misumessus dicaprio* sp. nov. is recorded from western North America from California, Utah and western Colorado, south to Arizona, New Mexico, and southwest Texas. *Misumessus tami* sp. nov. occurs in the southern half of peninsular Florida. *Misumessus quintero* sp. nov. is circum-Caribbean, with records from Mexico to Panama, Trinidad, and the Greater and Lesser Antilles. Another Antillean species, *M. bishopae* sp. nov., is known from Puerto Rico, Dominica, and possibly the Grenadines. *Misumessus blackwalli* sp. nov. is known from Bermuda from a single male; it is unlikely that this species represents *Thomisus pallens* Blackwall, 1868, a *nomen dubium* based on a juvenile female, and the only thomisid previously reported from Bermuda. This name has not been used since the 19th century other than in catalogs and checklists, and since its retention could potentially create a homonym, it is declared a *nomen oblitum*. The epigynal ‘hood’ of thomisids is considered misnamed, as it engages the retrolateral tibial apophysis (RTA), and is renamed the ‘coupling pocket’ as in other RTA elade members. A hood is herein considered to be a general term that refers to an epigynal outgrowth partly enclosing a depression that engages a structure on the palpal bulb rather than the palpal tibia.

Keywords: *Mecaphesa*, *Misumena*, *Misumenoides*, *Misumenops*, new species

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The genus *Misumessus* Banks, 1904 is one of five genera of Misumenini presently known from North America (Lehtinen 2004; Lehtinen & Marusik 2008). The others are *Mecaphesa* Simon, 1900, *Misumena* Latreille, 1804, *Misumenoides* F. O. Pickard-Cambridge, 1900, and *Misumenops* F. O. Pickard-Cambridge, 1900. *Misumessus* long was considered a synonym of *Misumenops* (Petrunkévitch 1911; Gertsch 1939), or a subgenus of *Misumenops* (Schick 1965). *Misumenops* was re-diagnosed by Lehtinen & Marusik (2008), resulting in the establishment of *Mecaphesa* and *Misumessus* as valid genera. Unfortunately the justification for elevating *Misumessus* was based only on analysis of female characters (Lehtinen & Marusik, 2008), which are re-evaluated herein, and the quite different male characters are analyzed as well.

Until now, *Misumessus* had been considered monotypic, with its type species, *M. oblongus* (Keyserling, 1880), reported as widespread from Canada to Guatemala, and also reported from the island of St. Vincent in the Lesser Antilles (World Spider Catalog 2017). Among collections examined are continental specimens from as far south as Panama, and from various islands including Bermuda, Trinidad, and the Greater and Lesser Antilles. The genus is not only more widespread than previously reported, but good evidence exists that there is not just one, but at least seven species of *Misumessus*.

The most conspicuous evidence for multiple species of *Misumessus* is found in the structure of the male palp. As in salticid genera with circular tegula (Maddison 2015) and as observed for some other Misumenini (Lehtinen & Marusik 2008), different species of *Misumessus* have the embolus beginning at different points on the circumference of the tegulum. In *Misumessus*, the starting position of the widened embolus base can be compared to hours on a clock face, as in

Lehtinen & Marusik (2008), or given in degrees of a circle with zero degrees in the 12:00 position.

A second piece of evidence for multiple species is the location of each type of male in its own distinctive geographic range, in most cases with little to no overlap between species (Fig. 1, distribution map). This is especially evident where there are major geographic divides like north-south oriented mountain ranges, such as the Rocky Mountains, between species.

Conversely, females are difficult to separate by genital structure; external intraspecific variation is great with considerable apparent interspecific overlap, and species-specific differences are subtle. However, these differences do exist, in the form of scape length, scape shape, modifications to the edges of the scape tip, and especially in the shape and size of the coupling pocket (‘hood’). Among some species it is clear that there are differences in the length of the epigynal copulatory ducts, but in other species, this is more difficult to evaluate due to the convoluted course of the ducts. Given that there are differences in embolus length among species, it would be expected that copulatory duct length would also vary among species. However, other differences exist as well, such as the amount of coiling and the placement of the wider section of the duct that enters the spermatheca.

Observations on terminology and the phylogenetic relationships of thomisids.—It is necessary here to address some terms in the family Thomisidae before proceeding further, which requires a summary of the phylogenetic position of the family. Although other hypotheses have been proposed, for the most part, thomisids have been considered to be related to one of two groups: either part of the Dionycha close to the Salticidae (Lehtinen 1967; Loerbroeks 1984; Edwards 2004; Ramírez

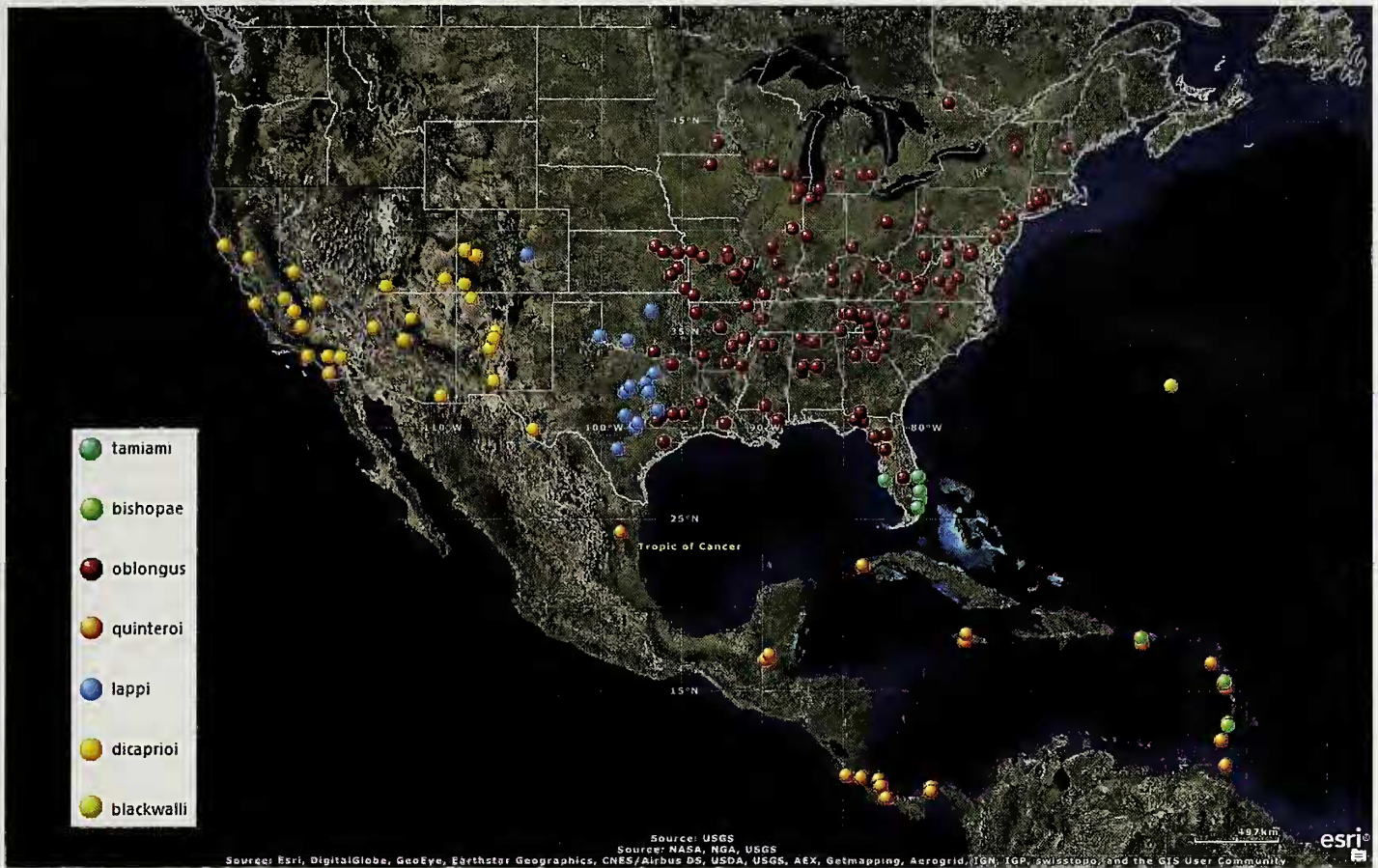


Figure 1.—Distribution of *Misumessus* species, with species denoted on map legend.

2014), with a retinal mosaic similar to salticids in the Australian thomisid *Hedana* sp. (Blest & O'Carroll 1989); or belonging to the Lycosoidea (Homann 1975; Corronca & Terán 1997, 2000; Ramírez 2014 as an alternate possibility). The most recent evidence based on molecular data favors lycosoids (Moradmand et al. 2014; Polotow et al. 2015; Garrison et al. 2016; Wheeler et al. 2016). While Garrison et al. (2016) indicated that the Lycosoidea and Dionycha were sister groups, with thomisids basal in the lycosoids, a similar study by Polotow et al. (2015; see also the morphological study by Ramírez 2014) analyzing a greater diversity of pertinent taxa, showed that the Dionycha were sister to a larger group known as the 'oval calamistrum clade' that included the Lycosoidea. They also indicated an immediate sister-group relationship of thomisids with oxyopids. Wheeler et al. (2016), in the most comprehensive review of spider phylogeny to date, gave a lycosoid phylogeny more consistent with Garrison et al. (2016). Here the thomisids were weakly associated with the Psecridae, and these families together were sister to a clade consisting of (in order) core Ctenidae, Oxyopidae (associated with Senoculidae), and the higher lycosoids.

In all of these cases, thomisids are part of the RTA clade, i.e., the palps each have a retrolateral tibial apophysis (RTA), with some exceptions (e.g., RTA lost in Lycosidae). Although morphological phylogenetic studies tend to weight male palps more than they do female epigyna due to the greater average

number of visible characters on the palps, epigyna should have corresponding characters to the functional parts of the palps. In this case, the RTA has a corresponding epigynal feature that has been known by several different names. Edwards (2015) gave it the functional name of 'coupling pocket' in salticids, which will be used here.

Many Thomisidae have a usually anterior epigynal structure that has been known as a hood. However, since this 'hood' engages the male retrolateral tibial apophysis, it is in fact a coupling pocket [e.g., *Ebrechtella tricuspidata* (Fabricius, 1775), "The more pointed and sclerotized tip of the rta ... is inserted into a median hood of the epigyne..."; Huber 1995: 155, as *Misumenops tricuspidatus*]. Hoods as they exist in other families (e.g., Salticidae in the Dionycha, Lycosidae in the Lycosoidea) are extrusions of the anterior edge of the epigynal plate; like a coupling pocket, they partially enclose a depression, which is the source of confusion. Even though both are engaged as intersexual copulatory mechanisms, there is a functional difference between them, as a hood (as defined here) engages part of the palpal bulb, while the coupling pocket engages the retrolateral tibial apophysis. In lycosids, it is the median apophysis (Dondale & Redner 1978a); in salticids, it is apparently a type of highly modified guide to brace the embolus (Edwards 2015). In addition, although many salticine salticids have posterior coupling pockets, others (e.g., some Freyina and Plexippini) have anterior coupling pockets like thomisids. This similar epigynal

structure, along with a similar palpal structure in basal salticids, may in part explain why thomisids and salticids have been thought to be related.

Another possible reason for this similarity is that if thomisids are basal lycosoids, and if lycosoids were directly sister to the Dionycha, then it is not unlikely that thomisids would have more in common with dionychans than would other lycosoids, due to shared symplesiomorphies. The simplified phylogeny illustrated by Garrison et al. (2016) suggested this relationship, and although the salticids alone were not likely to be the most basal group in dionychans, there was supporting evidence that they belonged to a near basal clade of families within that group (Ramírez 2014; Polotow et al. 2015), and thus might make a viable representative of what could be similar among basal dionychans and basal lycosoids. Ironically, the possibility that thomisids and oxyopids are sister groups would not negate this general idea, as oxyopids also have been thought to be related to salticids (Jackson 1986 and references therein). However, Wheeler et al. (2016) placed salticids in a terminal position in the Dionycha part B, much more distant from the thomisids; and since the lycosoids apparently are not direct sisters of dionychans nor basal in the oval calamistrum clade (Polotow et al. 2015), nor are thomisids alone basal in the lycosoids (Wheeler et al. 2016), there appear to be several other steps between dionychans and lycosoids that have yet to be shown to maintain morphological consistency in important structures like genitalia.

An offshoot of the revelation that thomisids are lycosoids is that there no longer seems to be any justification for using special color pattern terminology in thomisids, i.e., the carapace alatal bands (Schick 1965) can be referred to simply as submarginal bands as in lycosids (e.g., Dondale & Redner 1978a; Wallace & Exline 1978). However, the soma macrosetae designations of Schick (1965) seem to be useful and are utilized herein.

METHODS

Material examined.—The following institutions and individuals provided loans of types and other specimens: American Museum of Natural History (AMNH), New York, NY; British Natural History Museum (BNHM), London, United Kingdom; California Academy of Sciences (CAS), San Francisco, CA; Canadian National Collection (CNC), Ottawa, Canada; Denver Museum of Nature and Science (DMNS), Denver, CO; Field Museum of Natural History (FMNH), Chicago, IL; Florida State Collection of Arthropods (FSCA), Gainesville, FL; Hank Guarisco collection (HGC), Lawrence, KS; Museum of Comparative Zoology (MCZ), Cambridge, MA; Wild Basin Wilderness Preserve, Saint Edwards University (SEU), Austin, TX; Smithsonian Institution, United States National Museum (USNM), Washington D.C.; Texas A & M University Insect Collection (TAMU), College Station, TX; Biodiversity Collections, University of Texas at Austin (UTA), Austin, TX; University of Vermont (UVT), Burlington, VT. In addition, Joe Lapp and Leslie Bishop donated specimens to the FSCA (see Acknowledgments).

Morphological methods and abbreviations.—Specimens were examined in 75–80% ethanol, and sorted with Omana and

Leica MS5 microscopes. Photos were taken by J. T. Lapp with a Canon EOS T3i on a Zeiss Stemi 2000C microscope and stacked with Helicon Focus, and by GBE with an AxioCam HRc on a Zeiss V20 microscope using Zen stacking software. The map was created in ArcGIS, while figure plates were assembled in Corel Paintshop Pro X2. For localities, latitude and longitude coordinates as given on the collection label are recorded if present, otherwise county or other centroid lat/long coordinates are used to approximate the location. Measurements are in millimeters and are given as ‘mean (range),’ or ‘type (range)’ for designated types of new species (H = holotype, A = allotype); $n = 5$ for all species and available sexes except $n = 2$ for male *M. tamiami* sp. nov. and $n = 1$ for male *M. blackwalli* sp. nov. Obviously large and small adult specimens were included in the measurements in an attempt to sample the true size range for a species when available specimens exceeded five samples for each sex. The left palp is referenced for palp characters (right palp mirror-imaged if necessary). Specific references to eyes refer to the eye lenses. Introductory bibliographic citations in species accounts may have an exclamation point after a citation, indicating the author has examined the type(s) of the referenced species described therein, a commonly used convention in entomological taxonomic literature.

Individual scale bars are shown on images taken with Zen software, but other images lack scale bars. Due to the similar sizes of each species, images lacking scale bars can be assumed to approximate similar images with scale bars, or extrapolations can be made based on mean body size, given with each species description. BugGuide references are available online at <http://bugguide.net/node/view/15740> (use search for specific image numbers); the iNaturalist references are available online at <https://www.inaturalist.org/observations/7239942>

Abbreviations used in figures and descriptions are: A1, A2, S1, named carapace spiniform setae; ALE, anterior lateral eye; AME, anterior medial eye; CD, copulatory duct; Cl, clypeus; CO, copulatory opening; CP, coupling pocket [on posterior end of scape]; EB, embolus base; E, embolus; EGW, eye group width (measured at PLE); ET, embolus tip; ITA, intermediate tibial apophysis; PLE, posterior lateral eye; PME, posterior median eye; RTA, retrolateral tibial apophysis; S, spermatophore; Sc, scape [includes the coupling pocket]; Sp, spermathecae; Tg, tegulum; VTA, ventral tibial apophysis. Setal types: ‘clavate’ denotes relatively short, black, on body, similar to spiniform except the distal tip is broader than the base and flattened; ‘filiform’ denotes short, pale, slender and hair-like, on body and legs; ‘macroseta’ denotes relatively long, thick, dark, on legs (typically on true ventral surface); ‘spiniform’ denotes relatively short, black, on body and legs, with narrow conical slightly attenuate rounded tip (same as ‘rigid setae’ of Lehtinen & Marusik 2008). Clavate and spiniform setae can be thought of as types of soma macrosetae, versus typical ventral leg macrosetae, although they may also occur on the dorsal and lateral surfaces of the legs.

TAXONOMY

Family Thomisidae Sundevall, 1833
Subfamily Thomisinae Sundevall, 1833

Tribe Misumenini Dahl, 1913
Genus *Misumessus* Banks, 1904

Misumessus Banks, 1904: 112.

Type species.—*Misumena oblonga* Keyserling, 1880: 79, by monotypy.

Diagnosis.—*Misumessus* is considered a valid genus with the following presumed synapomorphies: female—epigynal scape present (Figs. 3f, i, 4g, 5e, 7f, 8g, 9a, e, g), coupling pocket more posteriorly placed than in related genera (on posterior end of scape), and coupling pocket miniaturized (Figs. 3h, 4h, 5e, 7h, 8h); male—embolus exceeding 360 degrees around tegulum (Figs. 3a, 4b, 5b, 7e, 10c, h, 11d, g, 12d), and RTA extended dorsally from a short base with a blunt tip curved in a distal direction (Figs. 3c, 4d, 5c, 7d, 10e, j, 11e, h, 12f).

Description.—*Females*: Body length 4–8 mm (with gravid females at upper end of range), with much greater body mass than males. In life, body typically pale green in color. Dorsal abdomen often has noticeable faint reticulation due to subdermal deposition of guanine, which may make most of abdominal dorsum appear white. Freshly preserved specimens appear white or pale yellow, but longer preserved specimens have darker yellowish brown carapace with large median pale patch of variable size and shape posterior to eye group; there are subtle differences in patch shape that may be species specific. Each lateral edge of carapace has row of short pale filiform setae. Carapace length and width nearly equal, but average slightly wider than long (usually less than 0.1 mm). Most species with clypeus slightly sloping forward from dorsal to ventral. Most species lack patterns on chelicerae. Sternum typically white.

All eyes ('eye group') continuously connected by surrounding white pigment; underlying retinæ individually encased in black pigment, usually not apparent (other than through the transparent but apparently 'black' lenses) unless preservation is suboptimal. Eye lenses all small, but ALEs noticeably largest; other lenses subequal in size, although AMEs typically slightly wider than posterior eyes, i.e., ALE >> AME > PLE = PME in most species. Distance between PMEs wider than between AMEs, so medial eyes form a trapezoid wider posteriorly. Posterior eye row wider than anterior eye row.

Face with distinctive pigmentation, including amount of pigment below eye group on clypeus, and presence/absence and orientation of minute gray or tan lines within pigmented eye group area. These lines may be due to patterns of reduced white pigmentation, therefore line color could be influenced by underlying integument color; or they may be darker pigmented areas. Females entirely lack dorsal spiniform setae on body, or on carapace may have some or all of A1, A2, or S1 spiniforms around lateral edge of eye group (see Schick 1965, fig. 1; Fig. 10a); otherwise with sparse filiform setae on dorsum.

Females have 3–5 spiniforms on prolateral and dorsal surfaces of all femora. Ventral surfaces of legs I and II have 4–5 large pairs of macrosetae on tibiae (sometimes 5th pair, if present, is smaller than others), and 6 pairs on metatarsi. Venter of femora of legs I–II in preserved females with broad white band, at least in *M. obscurus*, *M. quintero* sp. nov., and *M. tamiami* sp. nov.

Abdomen significantly longer than wide, or may be of roughly equal dimensions (e.g., in gravid females). Epigyne

with median extension directed posteriorly and positioned in the approximate middle of the epigyne; this is considered a scape (in the general sense) that is variable in length, width, and ventral profile (convex laterally or parallel-sided); the posterior edge may appear bilobed, convex, or truncate. Miniaturized coupling pocket at posterior end of scape. In posterior view, coupling pocket cavity can be seen (Figs. 3g, 4j, 5h, 7g, 8i).

Copulatory openings located on each side of coupling pocket in posterior view (Fig. 3g), in anterior part of posteriorly-placed atrium. Each of these opens directly into narrow copulatory duct that makes wide lateral spiral of about 1.5 revolutions whose circumference narrows on last half turn. Narrow section connects to wider section of duct that has sinuate shape, usually lateral to widest section of duct, until widest part enters anteromedial area of spermatheca. There may be small coils or partial loops in the wider section of the duct. Fertilization duct emerges from medial face of spermatheca.

Males: Body length 1.9–4.2 mm. In life, usually with yellow to reddish carapace, sternum yellow, and yellow abdomen often with white anterolateral bands or with medial darker pigment; femora of legs I and II, and all legs III and IV, pale green. Legs I and II with red or reddish brown bands on distal ends of femora, patellae, tibiae, metatarsi, and tarsi, and on proximal end of tibiae; otherwise distal segments yellow. Preserved males with darker carapace and eye group pigment as in females; legs III and IV translucent white with little or no pigment, or yellow. With full complement of spiniforms around and within eye group, and two rows of posterior carapace spiniforms, a subposterior row with four spiniforms on each side, and a posterior row with two spiniforms on each side. Legs I and II with inconspicuous ventral leg macrosetae, but like females, have row of 3–5 spiniforms on prolateral and dorsal surfaces of all femora. Abdomen dorsally noticeably covered with short dark regularly-spaced spiniforms, and sometimes seems to have a weakly sclerotized median scutum. Venter off white to pale yellow, usually without darker markings.

Embolus exceeds 360 degrees in rotation around tegulum. Species separated by location of embolus base origin and by amount of separation of embolus origin from embolus tip (measured in degrees herein). Lightly sclerotized embolus base, of characteristic elongate curved teardrop shape, is smoothly integrated along outer edge of tegulum. Embolus tip in slight groove on retrolateral edge of cymbium and generally emerges between 90 and 135 degrees.

There are species-specific differences in RTA shape, especially relative length of basal part, and amount and direction of curvature of distal part (see retrolateral and dorsal views of palps). Approximately basal third of RTA extends distally, is flattened cylindrical in shape, and is shallowly concave at distal end. Dorsal edge of RTA strongly developed, begins as continuation of concave distal surface that is diverted in a dorsal direction, and is curved to a stout tip, more or less pointing distally. Where dorsal edge diverted dorsally, retrolateral edge narrowed and slightly projects outward, which might be interpreted as small intermediate tibial apophysis (ITA). All species of *Misumessus* also have a small curved ventral tibial apophysis (VTA).

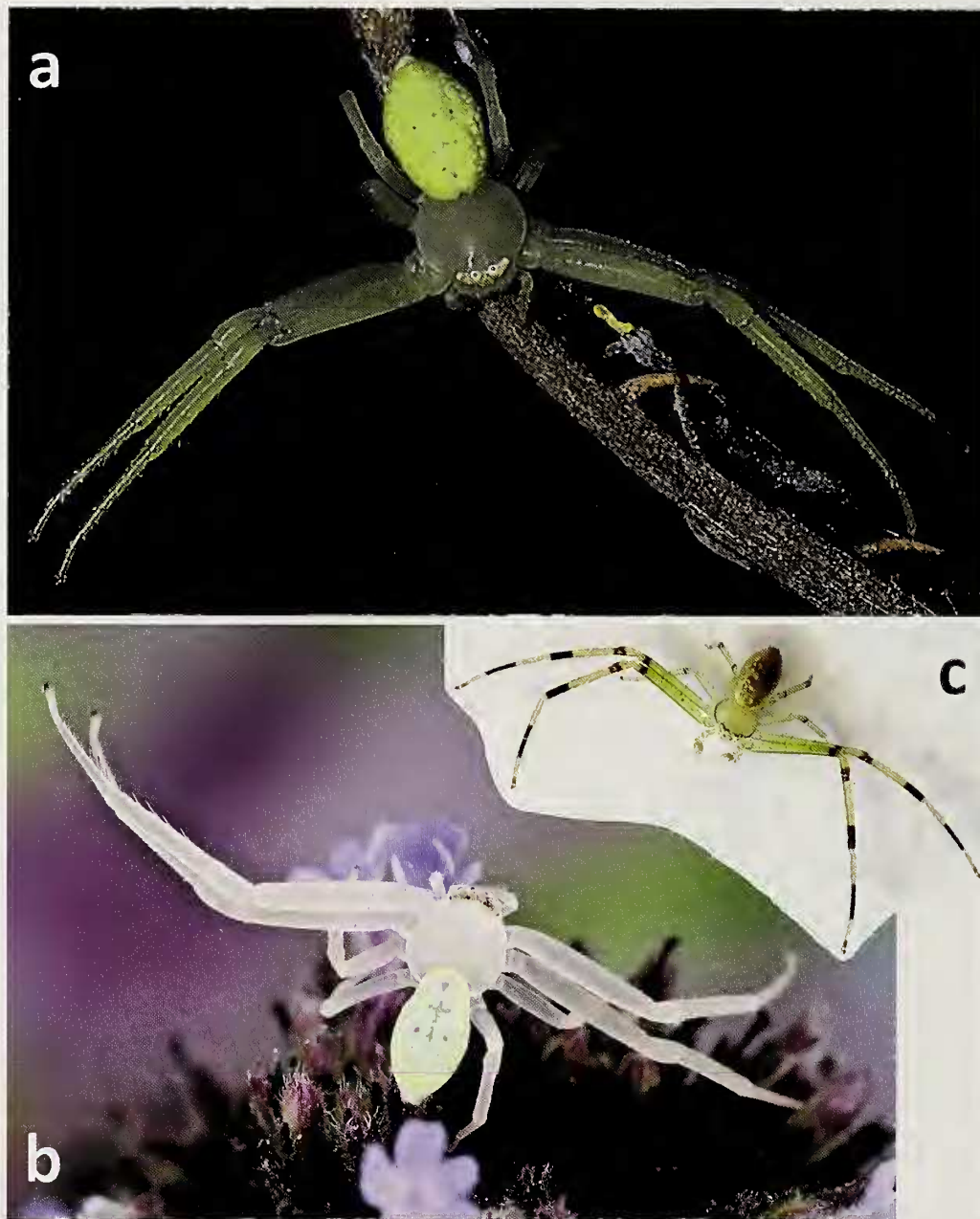


Figure 2.—*Misumessus oblongus* (Keyserling, 1880), live images. a, typical female from Florida; b, white form female from North Carolina; c, male from Kansas with maximum abdominal pigment. Photo credits: a by Daniel D. Dye II; b by Colin Hutton; c by Hank Guarisco.

Variation.—Notable exceptions to the general generic description are given here (also if pertinent included with individual species). Eye group pigment sometimes pink in part or entirely, or yellow in part or entirely. The AME of *M. lappi* sp. nov. are smaller than the posterior eyes. Female body color in life occasionally whitish or yellow; white in female and most male *M. lappi* sp. nov., amber to brown in *M. quintero* sp. nov. A pair of narrow yellow to red anterolateral abdominal bands occasionally are present, and rarely may be continuous anteriorly. Shape of posterior end of scape may in part be a function of how much separation there is between the scape and body (affecting the corresponding viewing angle of the observer). Males, especially smaller individuals, may have a

reduced number of spiniforms on the carapace; *M. blackwalli* sp. nov. lacks spiniforms on the abdomen. Gertsch (1939) noted other variations, including extra pairs of macrosetae on the metatarsi of legs I and II.

Notes.—According to Schick (1965: 111), “Guide pocket not present; instead, large tonguelike flap developed in anterior portion of epigynum; intromittent orifice obscure, situated at base of flap.” In fact, the guide pocket, what is named here the coupling pocket, is present, and the ‘flap’ is considered a scape, in agreement with Lehtinen & Marusik (2008). The copulatory openings are correctly indicated by Schick as near the base of the scape.

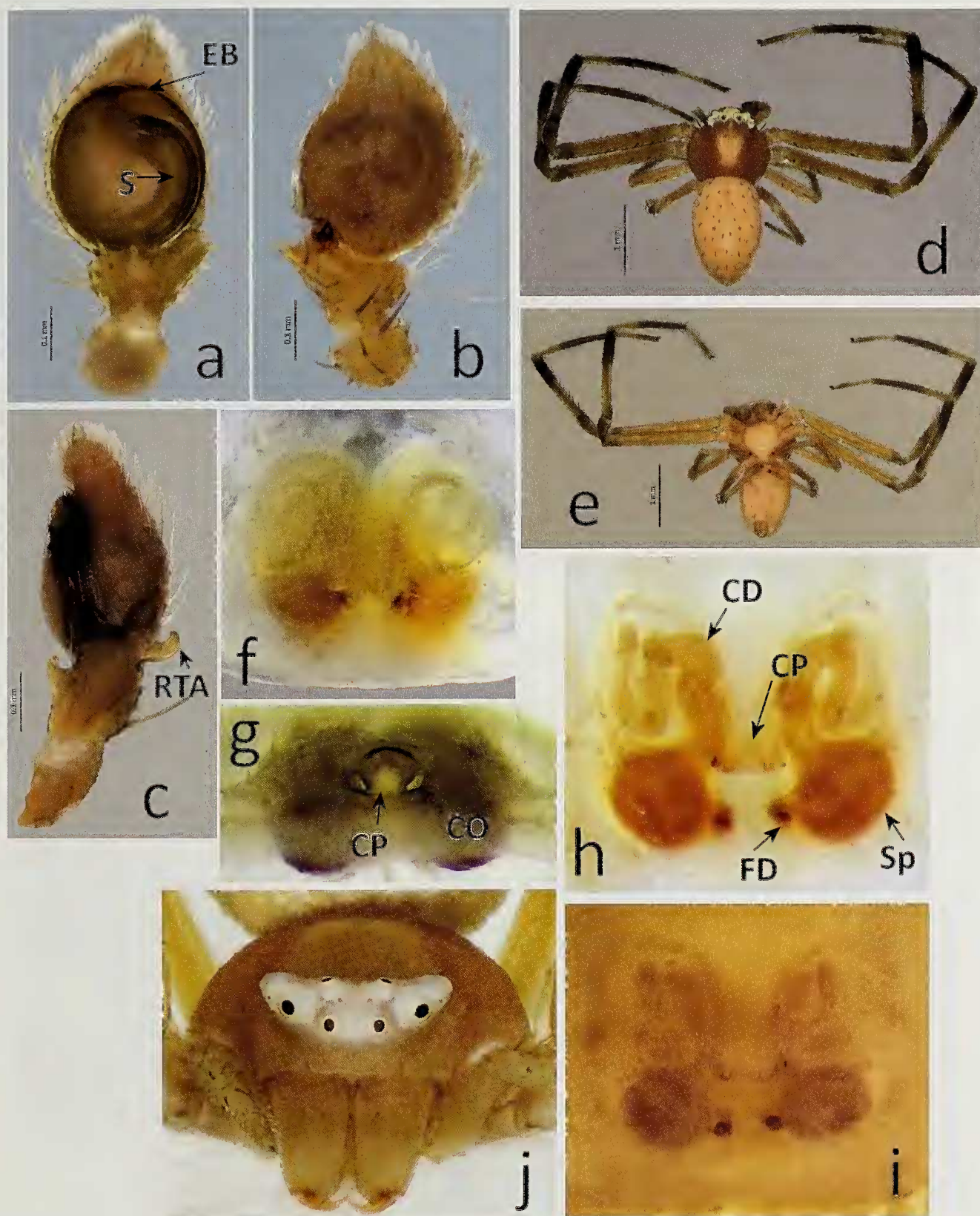


Figure 3.—*Misumessus oblongus* (Keyserling, 1880). a–e, Male from Florida: a, ventral palp; b, dorsal palp; c, retrolateral palp; d, dorsum; e, venter. f, Female from Texas, ventral epigyne cleared. g–j, Female from Wisconsin: g, posterior epigyne cleared; h, dorsal epigyne cleared; i, ventral epigyne; j, face. Photo credits: f–i by Joe Lapp.

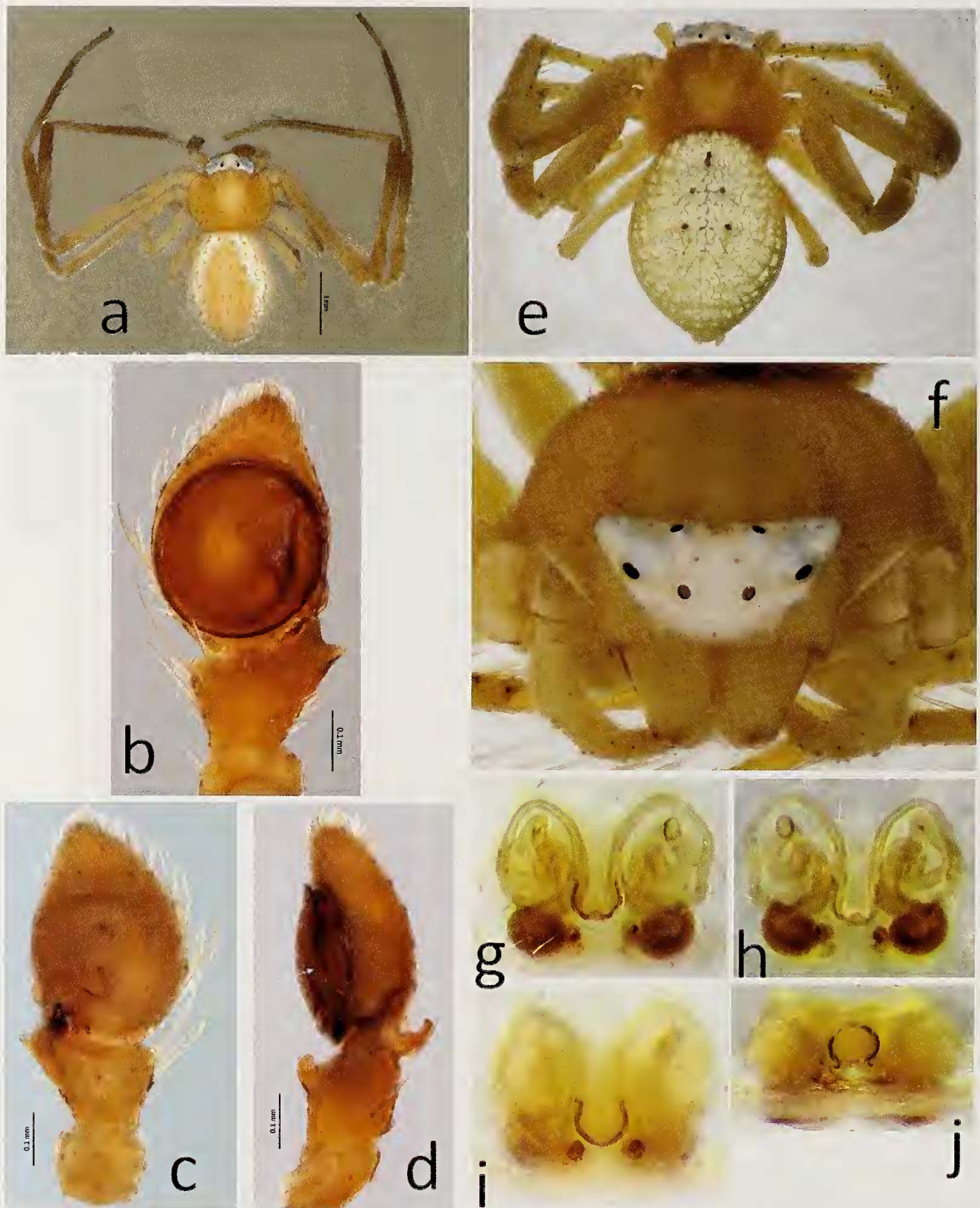


Figure 4.—*Misumessus dicaprioi* sp. nov. a–d, Male from California: a, dorsum; b, ventral palp; c, dorsal palp; d, retrolateral palp, arrow to transitional dark area between embolus base and spermophore. e–j, Female from Arizona: e, dorsum; f, face with extra clypeal pigment; g, ventral epigyne cleared; h, dorsal epigyne cleared; i, ventral epigyne; j, posterior epigyne cleared. Photo credits: e–j by Joe Lapp.

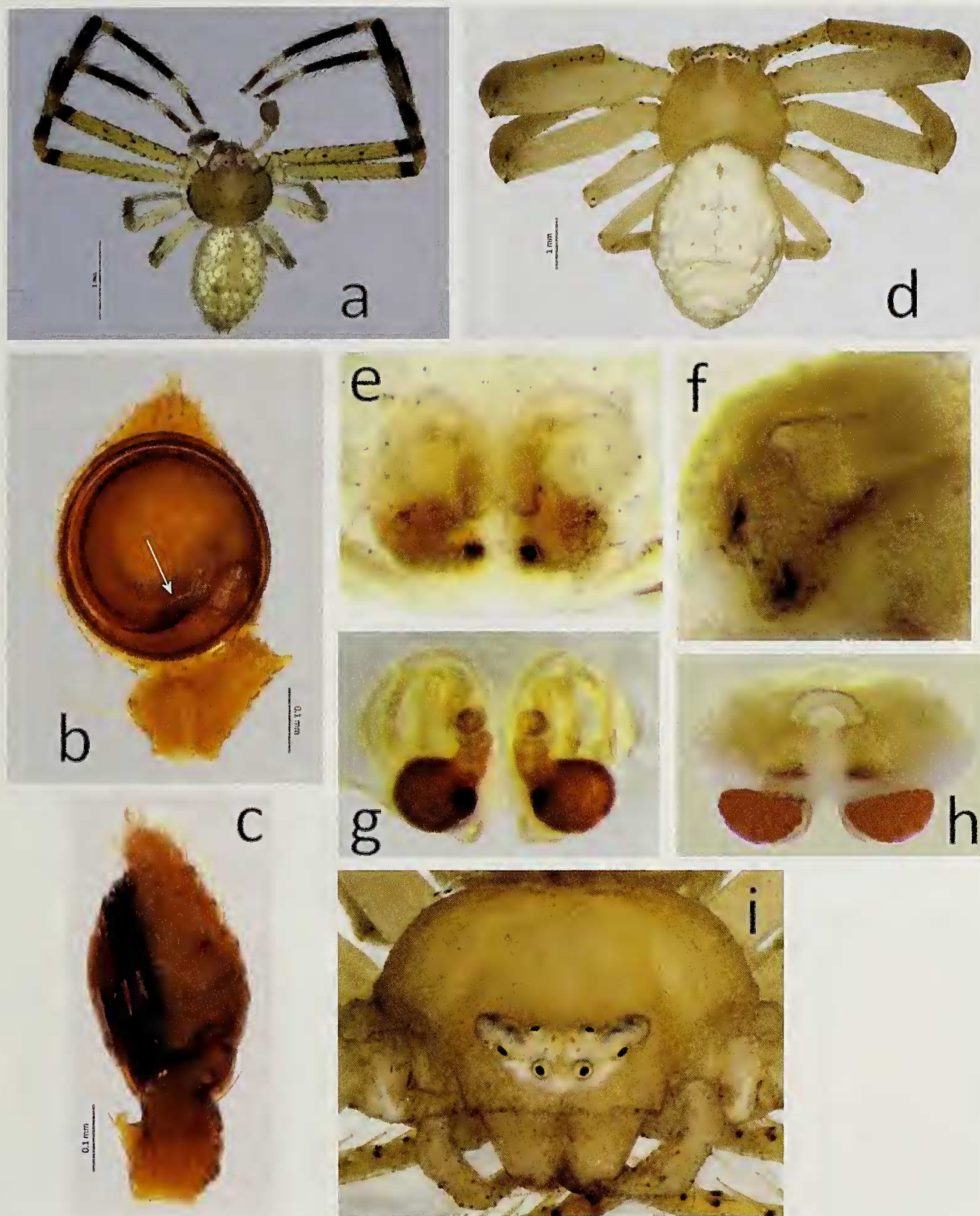


Figure 5.—*Misumessus tamiami* sp. nov. from Florida. a–c: Male: a, dorsum; b, ventral palp, arrow to transitional dark area between embolus base and spermophore; c, retrolateral palp. d–i, Female: d, dorsum; e, ventral epigyne; f, postero-ventrolateral epigyne showing scape elevation; g, dorsal epigyne cleared; h, posterior epigyne cleared; i, face. Photo credits: d–i by Joe Lapp.

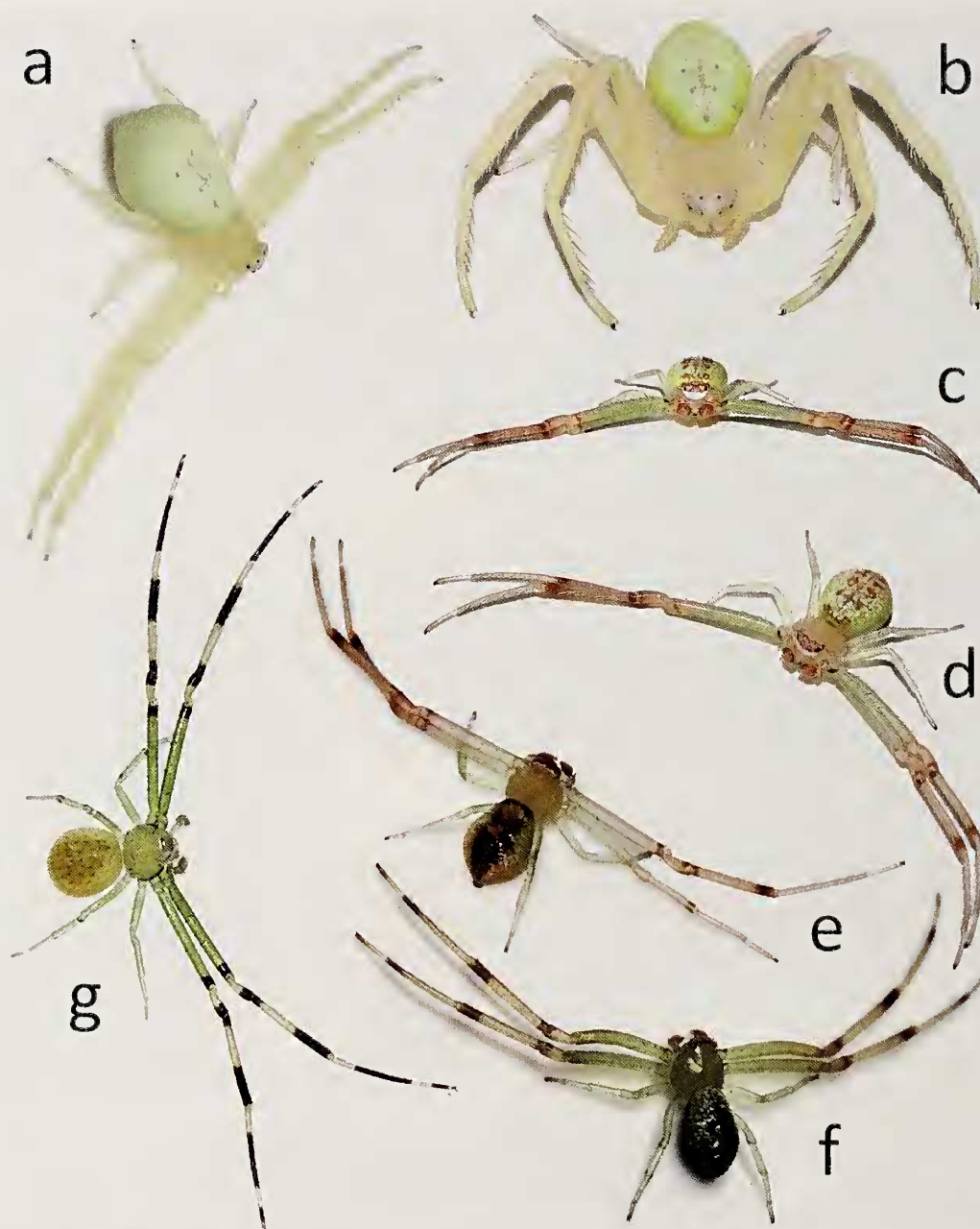


Figure 6.—*Misumessus lappi* sp. nov. from Texas, live images: a, penultimate female; b, adult female; e–f, adult males; c, d, holotype male, form with only red spots; e, form with additional red between red spots; f, dark green form; g, live male *Misumessus oblongus* (Keyserling, 1880) from Wisconsin. Note the proportionately longer legs I and II of *M. oblongus* compared to *M. lappi* sp. nov. Photo credits: a–f by Joe Lapp; g by Ilona Loser.

Misumessus oblongus (Keyserling, 1880)
(Figs. 2, 3, 6g)

Misumena oblonga Keyserling, 1880: 79 (Dm). Emerton, 1892: 371!

Misumena americana Keyserling, 1880: 85. (Df). Synonymized by Banks, 1893: 125. Simon, 1897: 876.

Misumenops oblongus (Keyserling): F. O. P.-Cambridge, 1900: 144; Gertsch, 1939: 319; Chickering, 1940: 197; Kaston, 1948: 415; Schick, 1965: 111; Dondale & Redner, 1978b: 141; Breene et al., 1993: 78.

Misumessus oblongus (Keyserling): Banks, 1904: 112; Lehtinen & Marusik, 2008: 195.

Type material.—*Syntype males* (of *M. oblonga*). UNITED STATES: *Maryland and Illinois*: I examined three male syntypes from Peoria, Illinois, deposited in the BNHM (BM1890.7.1.3682–4).

Syntype females (of *M. americana*): *Maryland and Illinois*: see Gertsch (1939) (not examined).

Other material examined.—CANADA: *Ontario*: 11 ♀, Farran Pt., Walton, 45.8208°N, 78.5443°W, D.C. Lowrie

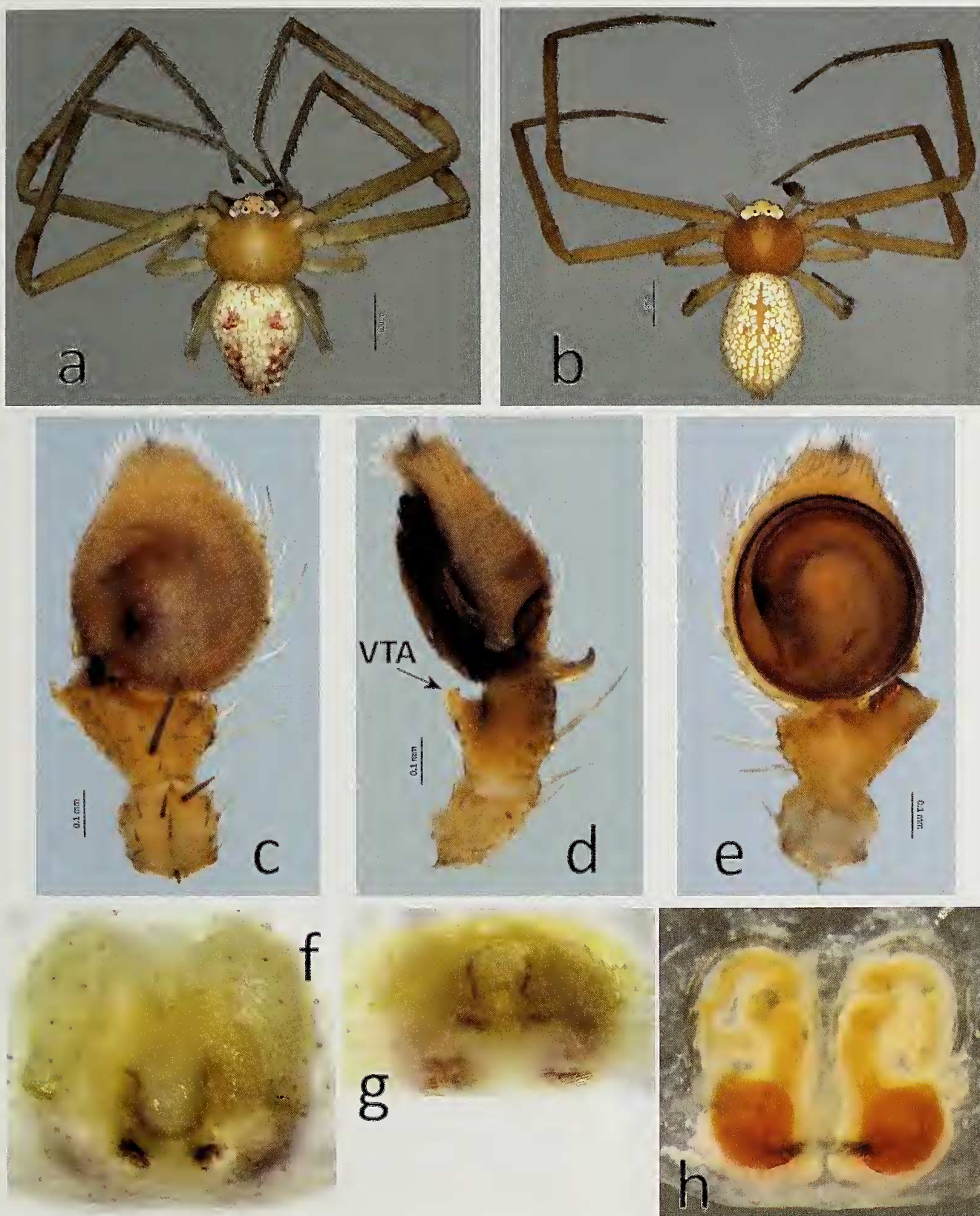


Figure 7.—*Misumessus lappi* sp. nov. from Texas. a–e, Males: a, paratype male dorsum, preserved one year; b, holotype male dorsum, preserved five years (compare to Fig. 6c, d); c, dorsal palp; d, retrolateral palp; e, ventral palp. f–h, Female: f, ventral epigyne; g, posterior epigyne cleared; h, dorsal epigyne cleared. Photo credits: f–h by Joe Lapp.

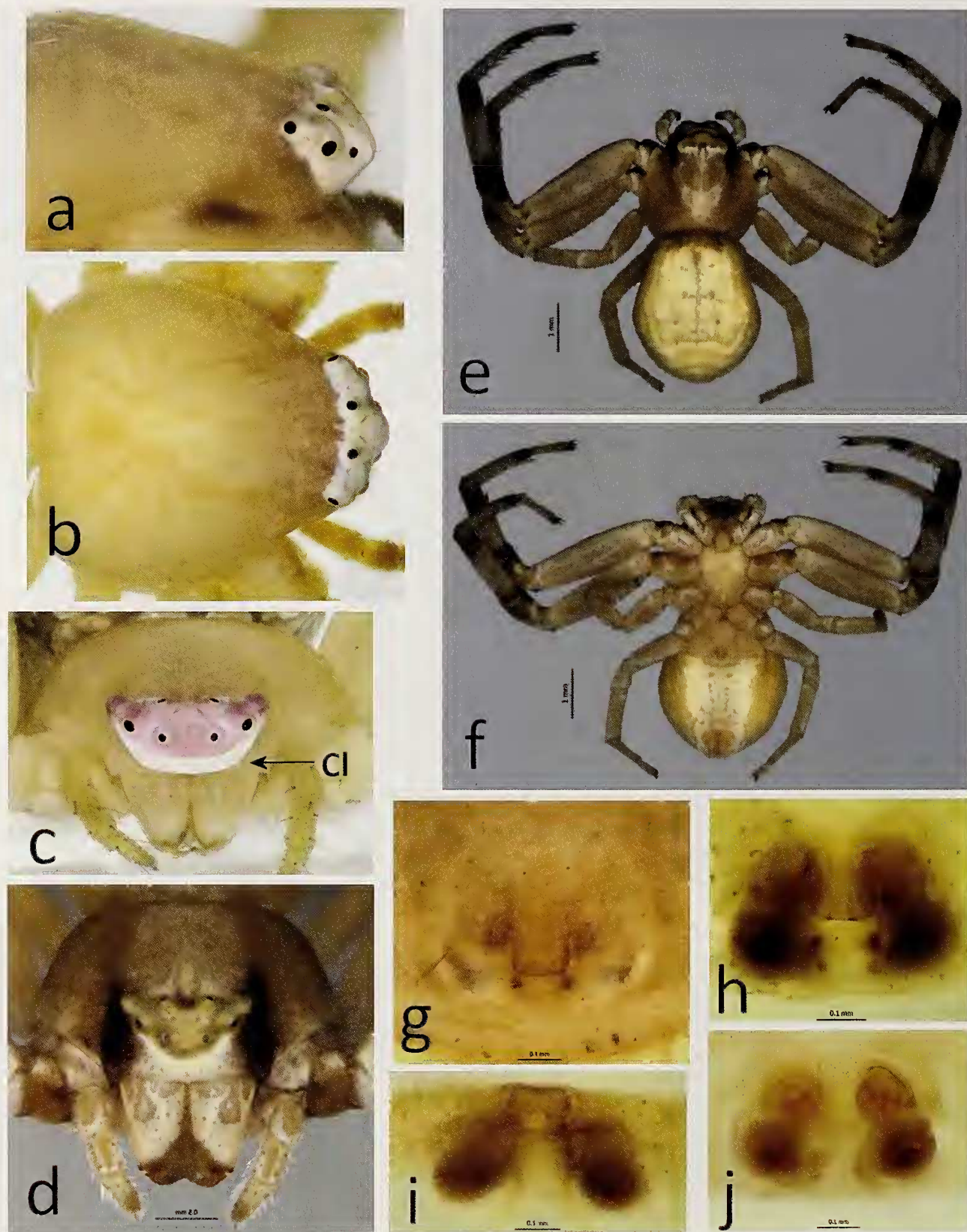


Figure 8.—*Misumessus* species. a–c, Female *M. lappi* sp. nov. from Texas: a, lateral carapace; b, dorsal carapace; c, face. d–j, Female *Misumessus quinteroi* sp. nov. from Puerto Rico: d, face; e, dorsum; f, venter; g, ventral epigyne; h, ventral epigyne cleared; i, posterior epigyne cleared; j, dorsal epigyne cleared. Photo credits: a–c by Joe Lapp.

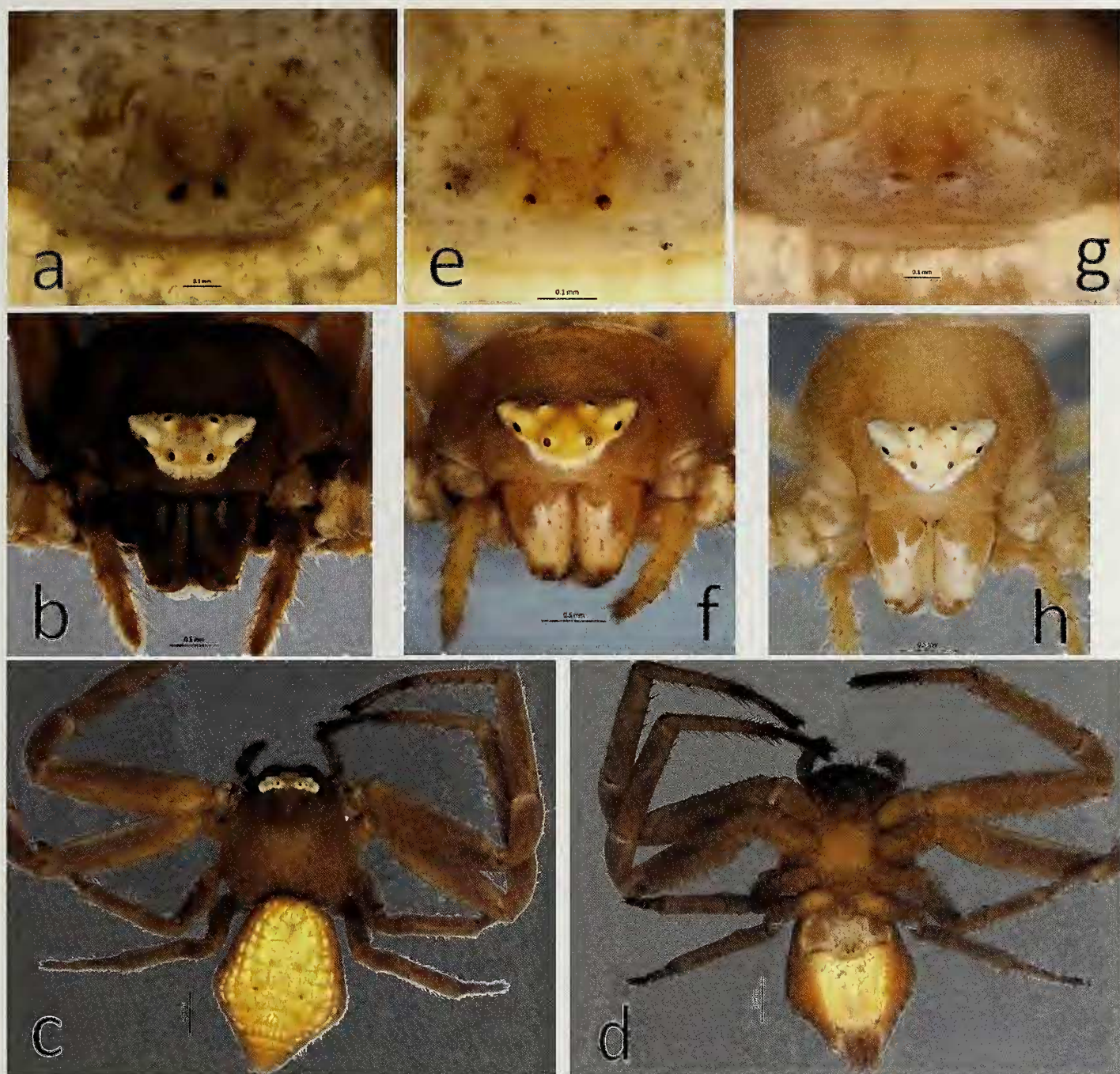


Figure 9.—*Misumessus quinteroi* sp. nov. a–d, Female from Costa Rica: a, ventral epigyne; b, face; c, dorsum; d, venter. e–f, Female from Jamaica: e, ventral epigyne; f, face. g–h, Female from Dominica: g, ventral epigyne; h, face.

(FMNH). UNITED STATES: *Alabama*: 1 ♀, Colbert Co., Wilson Dam, 34.7140°N, 87.7610°W, 1 August 1953, R. Schick (AMNH); 1 ♀, Hale Co., Moundville, 32.9906°N, 87.5834°W, 1 August 1939 (AMNH); 3 ♀, 2 penultimate ♀, Morgan Co., Decatur, 34.4954°N, 86.8811°W, 30 May 1939, A.F. Archer (AMNH); 1 ♀, Shelby Co., Oak Mt. St. Pk., 33.2601°N, 86.6702°W, July–August 1940, A.F. Archer (AMNH); 1 ♀, Tuscaloosa Co., Tuscaloosa, 33.2589°N, 87.5258°W, 22 April 2005 (AMNH). *Arkansas*: 1 ♂, 1 ♀, Bradley Co., 33.4746°N, 92.1961°W, 12 May 1964, W.H.

Whitcomb (CAS 9068465); 1 ♀, Chicot Co., 33.3088°N, 91.3136°W, soybeans, 11 July 1962, Boyer (CAS 9068448); 1 ♀, Conway Co., 35.2714°N, 92.6767°W, 5 July 1963 (CAS 9068459); 1 ♂, same data except 3 July 1964, B.A. Dumas (CAS 9068456); 1 ♂, same data except Morrilton, pitfall trap, 23 May 1964 (CAS 9068451); 2 ♀, same data except Plumerville, 35.2714°N, 92.6767°W, alfalfa, 18 June 1957, L. Moore (MCZ 72853); 1 ♀, Hempstead Co., 33.7892°N, 93.6823°W, cotton, 2 September 1960 (CAS 9068445); 1 ♂, 2 ♀, Jefferson Co., 34.2954°N, 91.9289°W, rice, 26–27 July 1963,

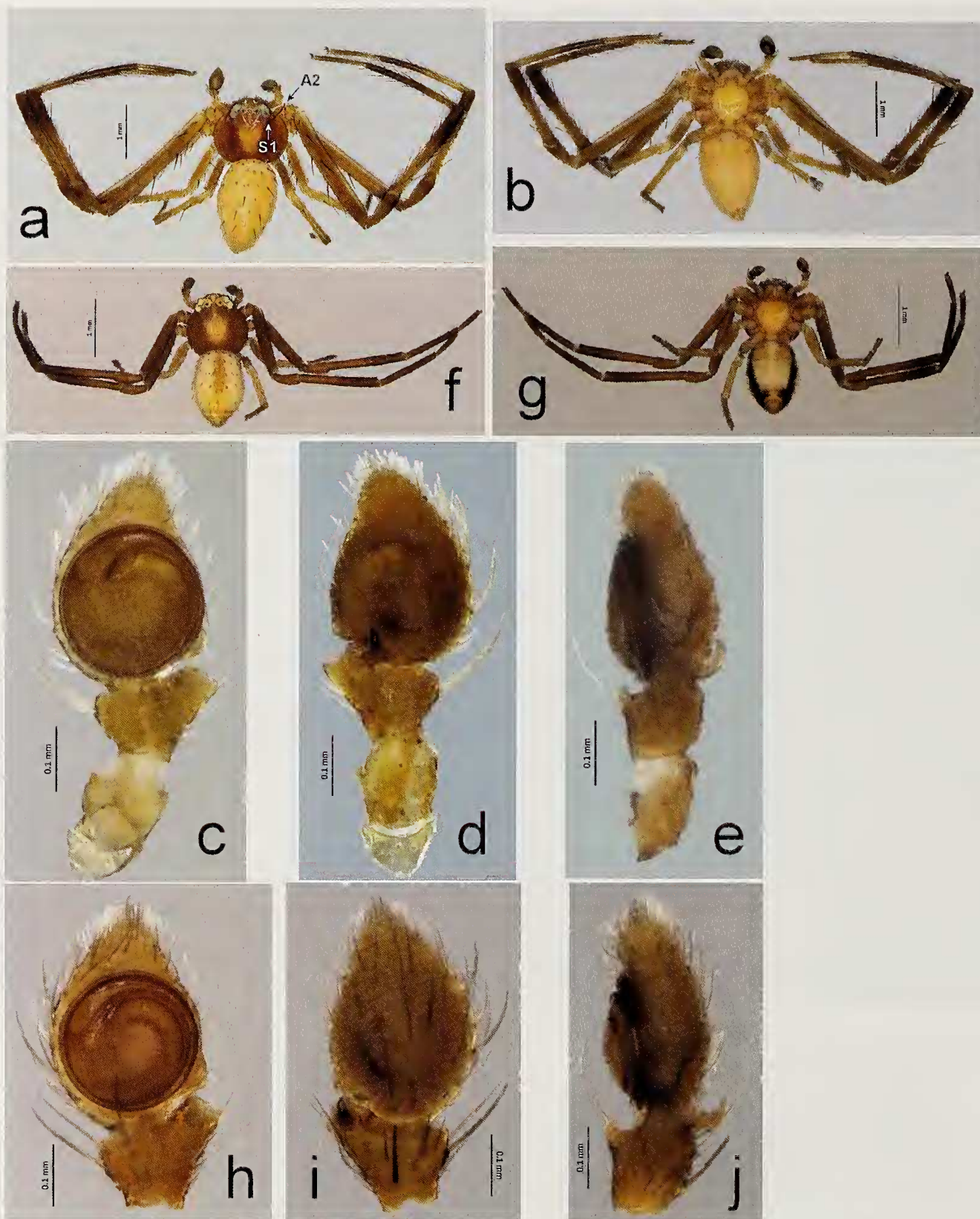


Figure 10.—*Misumessus quinteroi* sp. nov. a–e, Holotype male from Panama: a, dorsum, arrows to labeled elongate earapae spiniforms; b, venter; c, ventral palp; d, dorsal palp; e, retrolateral palp. f–j, Male from Dominica: f, dorsum; g, venter; h, ventral palp; i, dorsal palp; j, retrolateral palp.

- J. Guerra (CAS 9068446); 2 ♂, 3 ♀, same data except weeds, 25 June 1963, J. Guerra, (CAS 9068474); 1 ♀, same data except 1 July 1963, J. Guerra (CAS 9068464); 1 ♂, Mississippi Co., 35.7101°N, 90.0505°W, cotton, 18 August 1966 (CAS 9068437); 1 ♂, same data except 4 June 1966, W. Peck (CAS 9068442); 2 ♀, Monroe Co., 34.7134°N, 91.2149°W, 18 July 1963, W.H. Whitcomb (CAS 9068453); 1 ♂, 3 ♀, Randolph Co., 36.3494°N, 90.9710°W, 10 July 1963, I. Brown (CAS 9068449); 7 ♂, 1 ♀, Washington Co., Cove Creek Valley, 15 mi S Prairie Grove, Boston Mts, 35.9756°N, 94.1936°W, el. 1000', June 1957 (MCZ 72852). *Connecticut*: 1 ♂, Fairfield Co., Norwalk, 41.2272°N, 73.3775°W, 23 June 1933, Gertsch (AMNH); 1 ♀, same data except 22 October 1935, B.J. Kaston (AMNH); 1 ♀, same data except 4 July 1935, Gertsch (AMNH); 1 penultimate ♂, 1 juvenile ♀, 10 June 1933, Gertsch (AMNH); 1 ♂, Hartford Co. New Britain, 41.7936°N, 72.7305°W, 30 July 1948, B.J. Kaston, (USNM 2074581); 1 ♀, same data except 12 October 1949, B.J. Kaston (USNM 2074581); 1 penultimate ♀, Middlesex Co.: 41.4626°N, 72.5347°W, Middlefield, 30 June 1935, H.L. Johnson (AMNH); 1 ♀, same data except Middletown, 1 August 1935, H.L. Johnson (USNM 2074581); 1 ♂, New Haven Co., 41.3919°N, 72.9411°W, 19 July 1938, D.S. Riggs (USNM 2074581); 1 ♀, same data except Branford, 12 September 1935, B.J. Kaston (AMNH); 1 ♂, same data except Orange, 28 June 1935, B.J. Kaston (USNM 2074581); 1 ♀, same data except Westville, 15 April 1905, B.J. Kaston (USNM 2074581). *Delaware*: 1 ♂, New Castle Co., Hockessin, 39.6260°N, 75.6087°W, June 1988, P. Sierwald (FMNH 0000 044 881). *Florida*: 1 ♂ Alachua Co., 29.6943°N, 82.3797°W, 4 October 1934, H.K. Wallace 320 (FSCA); 1 ♂, same data except 18 April 1935, H.K. Wallace 395 (FSCA); 4 ♀, same data except Micanopy, 5 mi E, 29.6943°N, 82.3797, Bridge over River Styx in sphecid mud nest, 13 August 1963, K. Stone (FSCA); 1 ♀, same data except 14 August 1963, K. Stone (FSCA); 1 ♀, same data except 15 August 1963, K. Stone (FSCA); 5 ♂, 1 ♀, same data except Gainesville, *Albizia julibrissin* (in bloom), 26 June 1984, M. Plagens (FSCA); 2 penultimate ♀, same data except 12 June 1935, Gertsch (AMNH); 1 ♀, Citrus Co., 28.8583°N, 82.4609°W, *Salvia lyrata*, 21 April 1987, R. Dudley (FSCA); 1 ♀, Dixie Co., Old Town, 4 mi N, 29.5546°N, 83.1068°W, mesophytic understory, 23 May 1979, G.B. Edwards (FSCA); 1 ♀, same data except 5 April 1980, G.B. Edwards (FSCA); 1 ♂, Highlands Co., 27.3603°N, 81.3398°W, 22 August 1989, J. Bennett (FSCA); 9 ♂, Jefferson Co., 30.3658°N, 83.8529°W, 1 July 1968 Whitcomb (MCZ 72859); 4 ♂, 2 ♀, same data except 17 July 1968, Whitcomb (MCZ 72858); 2 ♂, Leon Co., Tall Timbers Res. Sta., 30.4645°N, 84.2918°W: wooden bridge, prey of *Trypargilum clavata*, 18 July 1974, G.B. Edwards (FSCA); 1 ♀, same data except on magnolia, 12 June 1981, G.B. Edwards (FSCA); 3 ♀, Martin Co., Port Sewall, 27.1464°N, 80.3148°W, 27 December 1938 & 8–12 February 1939 (AMNH); 1 ♀, Sarasota Co., Myakka River State Park, 27.2051°N, 82.4330°W, 6 April 1938, Gertsch (AMNH). *Georgia*: 1 ♂, 3 ♀, 1 juvenile, Fulton Co., 33.8302°N, 84.3152°W, May 1899, J.H. Emerton (AMNH); 1 juvenile, Habersham Co., 34°36'N, 83°31'W, 27 April 1943, W. Ivie (AMNH); 1 ♂, Oglethorpe Co., East of Lexington, 33°50'N, 83°03'W, 22 April 1943, W. Ivie (AMNH); 1 ♂, Rayburn Co., Rayburn Bald, 34.9656°N, 83.2999°W, 8 August 1957, (CNC); 1 ♂, Thomas Co., Bar M Ranch, S of Boston, 30.8992°N, 83.9360°W, 25 June 1978, H., L. & F. Levi (MCZ 72855); 1 ♂, same data except 25 June 1978, H., L. & F. Levi (MCZ 72857). *Iowa*: 1 ♂, Cerro Gordo Co., McIntosh Woods nr. Clear Lake, 43.0933°N, 93.2575°W, woods, 14 June 1961, H. Levi (MCZ 72848). *Illinois*: 1 ♀, Champaign Co., 40.1233°N, 88.1872°W, on wild cherry-eating caterpillars, (AMNH); 1 ♂, Cook Co., Palos Park, 41.8783°N, 87.7460°W, 30 May 1911, A.B. Wolcott (FMNH); 4 ♀, Marion Co., Centralia, 38.4586°N, 89.1679°W, mud dauber nest, N. Banks (MCZ 72481); 2 ♂, Montgomery Co., Farmersville, 39°25'N, 89°40'W, 10 June 1933, W. Ivie (AMNH); 1 ♂, Pope Co., Kaskaskia experimental forest (within Shawnee National Forest), 37.4948°N, 88.8008°W, 7 May 1968, (AMNH); 1 ♂, Will Co., New Lenox, 41.4886°N, 87.9885°W, 8 July 1933, D.C. Lowrie (FMNH). *Indiana*: 2 ♂, La Porte Co., Smith, 41.5267°N, 86.7413°W, 23 May 1936, D.C. Lowrie (FMNH); 1 ♀, same data except 41.4586°N, 87.0940°W, 21 May 1938, D.C. Lowrie (FMNH); 1 ♂, Parke Co., 39.7557°N, 87.2493°W, 19 May 1965, Lillian Ross (FMNH Z 15 735); 1 ♂, Porter Co., Dune Acres, 41.4586°N, 87.0940°W, 6 June 1936, D.C. Lowrie (FMNH). *Kansas*: 1 ♂, Anderson Co., Garnett, 38.2107°N, 95.2858°W, 10 August 1989, H. Guarisco (HGC); 1 ♂, Cherokee Co., KSU pecan experimental field, 37.1857°N, 94.8142°W, 1 August 1984, H. Guarisco (HGC 6631); 1 ♂, same data except 5 June 1986, H. Guarisco (HGC 6643); 1 ♂, same data except 4 June 1987, H. Guarisco (HGC 8459); 1 ♂, same data except 22 May 1986, H. Guarisco (HGC 6625); 2 ♂, same data except 19 June 1986, H. Guarisco (HGC 6621); 1 ♂, same data except 22 May 1986, H. Guarisco (HGC 6633); 1 ♂, same data except 11 June 1985, H. Guarisco (HGC 6629); 1 ♂, Douglas Co., Baldwin City, 38.9040°N, 95.2907°W, mud dauber nest, 19 June 1991, H. Guarisco (HGC 4767); 1 ♂, same data except Fitch Nat Hist Res., 38.9040°N, 95.2907°W, 15 July 1987, H. Guarisco (HGC 2429); 1 ♀, same data except 1 August 1989, H. Guarisco (HGC 311); 1 ♂, Riley Co., Konza Prairie, 39°05'27"N, 96°35'09"W, 12–15 June 2001, H. Guarisco (HGC 4643); 1 ♂, Webaunsee Co., Lake Webaunsee, 38.9515°N, 96.1913°W, 22 July 2015, H. Guarisco (HGC 8734); 9 ♀, Woodson Co., Toronto St Pk, 37.9030°N, 95.7010°W, 4 September 1980, H. Guarisco (HGC 8583). *Kentucky*: 1 ♂, Jefferson Co., Louisville, 38.2046°N, 85.6788°W, 18 July 1933, Gertsch (AMNH); 1 ♂, LaRue Co., Sonora, 1 mi E, 37.4945°N, 85.6742°W, 5 July 1985, H.A. Dean (TAMU); 1 ♂, Madison Co., 37.7041°N, 84.2627°W, 6 July 1985, H.A. Dean (TAMU). *Louisiana*: 1 ♀, Acadia Parish, 30°N, 92°W, 30 August 1933 (AMNH). *Maryland*: 1 ♀, Montgomery Co., Plummer's Island, 39.1168°N, 77.1587°W, 11 July 1956, K.V. Krombein (USNM 2074581). *Michigan*: 1 ♂, Barry Co., Gun Lake, 42.6223°N, 85.3158°W, 30 June 1970, N.P. (AMNH); 1 ♂, Berrien Co., Sawyer, 41.9646°N, 86.5062°W, cultivated blueberry plants, 22 July 1964, T. Burger (CAS 9068472); 1 ♀, Livingston Co., E.S. George Reserve, 42.5695°N, 83.8984°W, 7 July 1951, H.K. Wallace (AMNH); 1 ♂, Oakland Co., Royal Oak, 42.6116°N, 83.3279°W, 16 July 1936, M.H. Hatch (CAS 9068454). *Minnesota*: 1 ♂, Dodge Co., Claremont, 3 mi NE, 44.0366°N, 92.8563°W, sweeping herbs, 25 June 1966, D.T. Jennings (DMNS 23397). *Missouri*: 1 ♀, Boone Co.,

Columbia, 38.9625°N, 92.2633°W, 9 July 1966, Bayer (UTA 61585); 1 ♂, same data except 38°N, 92°W, Jun (AMNH); 1 ♂, Cole Co., Jefferson City, 38.6431°N, 92.1130°W, 21 August 1945, W.W. Dowdy (USNM 2074581); 1 ♀, Crawford Co., Merimac River, 37.9424°N, 91.3218°W, 25 August 1962, D.L. & H.E. Frizzell, B. Vogel (CAS 9068457); 1 ♀, Dent Co., Hobson, 37.6111°N, 91.5194°W, 7 July 1959, H.E. Frizzell, V. Baird (CAS 906847); 1 ♀, Franklin Co., W of Jewith Hwy, 38.4260°N, 91.0186°W, 12 August 1979, S. Parshall (FMNH 0000 073 950); 1 ♀, Jackson Co., 39.0239°N, 94.4190°W, 25 June 1975, Dondale (CNC); 1 ♂, 1 ♀, same data except Sibley, Fort Osage, 39.0239°N, 94.4190°W, sweeping herbaceous vegetation near deciduous woods, 25 June 1975, B. Cutler, D. T. Jennings (AMNH); 1 ♂, Johnson Co., Warrensburg, 38.7192°N, 93.7787°W, sweep sun low veg, 2 June 1965, D.L. Frizzell (CAS 9068406); 2 ♂, same data except sweeping upland shrubs, 27 May 1962, W. Peck (CAS 9068432); 1 ♂, same data except 1 June 1963, W. Peck (CAS 9068405); 1 ♂, same data except on web hanging from tree, 19 August 1961, W. Peck (CAS 9068455); 1 ♀, same data except 9 September 1961, W. Peck, D.L. & H.E. Frizzell (CAS 9068458); 1 ♂, Newton Co., Newtonia, 36.8905°N, 94.2853°W, open field, tall grass, 30 May 1962, W. Peck (CAS 9068467); 1 ♂, Phelps Co., Beaver Creek, 10 mi. S of Rolla, 37.8597°N, 91.7734°W, 11 June 1950, H.E. & D.L. Frizzell (CAS 9068435); 2 ♀, Rolla Co., Dry Fork Creek, 38.7629°N, 93.7361°W, 15 July 1951, H.E. & D.L. Frizzell (CAS 9068471); 2 ♀, same data except 15 July 1951, H.E. & D.L. Frizzell (CAS 9068463); 1 ♀, 1 ♂, same data except 23 June 1949, H.E. & D.L. Frizzell, E.S.L.? (CAS 9068439); 1 ♀, same data except 1 June 1951, D.L. Frizzell (CAS 9068447); 1 ♀, same data except 9 October 1950, H.E. & D.L. Frizzell (CAS 9068441); 1 ♀, same data except Rolla, 20 July 1967, D.L. Frizzell (CAS 9068469); 1 ♀, Stoddard Co., Ardeola, 36.9122°N, 89.9298°W, 22 July 1950, H.E. & D.L. Frizzell (CAS 9068466); 1 ♀, same data except Bloomfield, 9 mi. N, 22 July 1950, D.L. & H.E. Frizzell (CAS 9068444). *Mississippi*: 1 ♀, 1 juvenile, Harrison Co., Gulfport, 30.4336°N, 89.0753°W, 28 August 1933, W. Ivie (AMNH); 2 ♂, Lafayette Co., Oxford, 34.3457°N, 89.4808°W (AMNH); 2 ♂, Marion Co., Columbia, 31.1971°N, 89.8893°W, (AMNH); 1 ♂, Panola Co., 34.3549°N, 89.9762°W, 6–9 Sept 1962, H.E. & D.L. Frizzell, L. Sardis (CAS 9068468). *North Carolina*: 1 ♂, Buncombe Co., Montreat, 35.5972°N, 82.5293°W, 12 June 1953, R.D. Barnes (AMNH); 2 ♀, 1 penultimate ♀, same data except Black Mts, Beutenmuller (AMNH); 1 ♂, Durham Co., Duke Forest, 36.0362°N, 78.8792°W, 13–18 June 1933, A.M. Chickering (MCZ 72851); 1 ♀, Lincoln Co., Lincolnton, 35.4810°N, 81.2233°W, L. Cobb (USNM 2074581); 1 ♀, Macon Co., 35°06'17"N, 83°17'14"W, beating, 16 July 1998, I. Agnarsson (USNM 2074581); 1 ♀, same data except 35.0959°N, 83.3700°W, beating, 14 July 1998, I. Agnarsson (USNM 2074581); 1 ♂, same data except Wayah Bald, 10 August 1957, Maconlo (CNC); 2 ♂, 13 July 1957 (CNC); 1 ♂, Swain Co., Great Smoky Mt Natl Pk, Indian Gap, 35.4301°N, 83.4457°W, 2 July 1957, J.R. Vockeroth (CNC). *New Hampshire*: 1 ♂, Carroll Co., West Ossipee, 43.7726°N, 71.1918°W, 1 August 1936, S. Mulaik (AMNH). *New Jersey*: 4 ♀, Hunterdon Co., Lambertville, 40°22'N, 74°56'W, 26 July 1953, W. Ivie (AMNH); 3 juveniles, same data except 1 June 1953, W. Ivie (AMNH); 2 ♀, same data except 1 July 1953, W.

Ivie (AMNH); 1 ♂, Somerset Co., Bedminster, 40.5683°N, 74.6167°W, sweep misc. veg., 14 July 1991, D.A. Dean (TAMU). *New York*: 1 ♀, Essex Co., Adirondack Mountains, 44.1282°N, 73.8692°W, 31 July 1893 (USNM 2074581). *Ohio*: 1 penultimate ♀, Hamilton Co., Cincinnati, 39.1705°N, 84.5222°W, 22 June 1980, G.B. Edwards (FSCA); 1 ♂, 2 ♀, Knox Co., Gambier, 40.3820°N, 82.3815°W (AMNH). *Oklahoma*: 1 ♀, Marshall Co., Lake Texoma, Oklahoma Univ. Biological station, 33.9944°N, 96.7373°W, 1 June 1963, C.S. Lin (AMNH). *Pennsylvania*: 1 ♀, Bucks Co., NE of Jamison, nr Furlong, 40.3101°N, 75.0735°W, 1 June 1957, W. Ivie (AMNH); 4 ♂, 5 penultimate ♀, 1 juvenile, same data except Horseshoe Bend, Neshaminy Creek, 40°16'N, 75°3'W, 1 June 1954, W. Ivie (AMNH); 1 ♂, same data except E of Jamison, Neshaminy Creek, 33°16'N, 75°03'W, 8 June 1963, W. Ivie (AMNH); 2 ♂, Butler Co., Slippery Rock, 5 mi SE, 40.9168°N, 79.9103°W, 28 June 1967, B. Vogel (DMNS 2053); 1 ♀, Washington Co., 40.1368°N, 80.1875°W, 15 August 1979 (AMNH). *South Carolina*: 1 ♀, Abbeville Co., 34.2572°N, 82.4672°W, 20 November 1953, Lillian Ross (FMNH Z 15 733); 1 ♀, 1 penultimate ♀, Greenville Co., Greenville, 34.8817°N, 82.3996°W, 16 June 1980, R.S. Peigler (TAMU). *Tennessee*: 1 ♀, Blount Co., Hatcher Mountain, 35.7391°N, 83.9528°W, 4 July 1978, V. McNeilus (UTA 1701); 3 ♀, same data except Great Smoky Mountains, 35.8470°N, 83.5440°W, 8 July 1933, Gertsch (AMNH); 3 ♂, same data except Great Smoky Mt. NP, Chestnut Ridge Trail, 35.7391°N, 83.9528, 4 June 1978, V. McNeilus (UTA 1697); 1 ♂, Cumberland Co., Crossville, 2 mi N, 35.9576°N, 84.9742°W, 23 July 1978, V. McNeilus (UTA 1702); 1 ♂, Hamilton Co., Chattanooga, 35.1221°N, 85.2167°W, 28 May 1987, H.A. Dean (TAMU); 1 ♂, 3 ♀, Knox Co., Knoxville, 35.9845°N, 83.9516°W, 7 July 1933, W.J. Gertsch (USNM 2074581); 1 ♂, same data except 14 May 1975, Kronk (UTA 7399); 1 ♂, same data except North Shore Dr., 14 June 1977, V. McNeilus (UTA 1699); 7 ♀, Roane Co., Kingston, 35.9073°N, 84.5337°W, 2 July 1933, Gertsch (AMNH); 1 ♂, Sevier Co., Elkmont, 35.8517°N, 83.5720°W, 11 June 1939, Kaston (AMNH). *Texas*: 1 ♂, Brazos Co., 30.6404°N, 96.3379°W, suction trap, 2 August 1979, D.A. Dean, J. Taylor (TAMU voucher specimen #585); 1 ♀, same data except mud dauber nest, 8 October 1985, D.A. Dean (TAMU); 1 ♂, Burleson Co., Adriance Orchard, 30.4473°N, 96.5939°W, from pecan, 7 May 1992, T.Y. Li (TAMU); 1 ♀ 1 ♂, Comanche Co., 32.0789°N, 98.4708°W, fogging in pecan at night, 17 July 2001, A. Calixto, A. Knutson (TAMU); 1 ♂, Delta Co., 33.3691°N, 95.6552°W, D Vac cotton, 10 August 1983, D.A. Dean (TAMU); 1 ♂, Polk Co., 30.7790°N, 94.8875°W, 22 May 1984, J.B. Woolley (TAMU); 17 ♂, Robertson Co., 30.748°N, 96.551°W, fogging in pecan at night, 7 July 2001, A. Calixto, A. Knutson (TAMU); 1 ♂, same data except 1 June 2001, A. Calixto, A. Knutson (TAMU); 1 ♀, 1 ♂, same data except 14 August 2001, A. Calixto, A. Knutson (TAMU); 1 ♂, same data except 30°44'54.5"N, 96°33'19.1"W, cardboard bands in pecan, 9 July 2001, A. Calixto (TAMU); 1 ♂, Sabine Co., 31.3242°N, 93.8283°W, flight intercept trap, beech magnolia forest, 25 Aug–10 September 1989, R.E. Anderson, E. Morris (TAMU 930); 1 ♂, Travis Co., Austin, 30.3152°N, 97.7561°W, (AMNH); 1 ♂, same data except 21 July 1947, H.E. & D.L. Frizzell (CAS 9068433); 1 ♂, Walker Co.,

30.7590°N, 95.5445°W, Ellis Prison Unit, 18 August 1980, D.A. Dean (TAMU); 1 ♂, same data except cotton, 9 May 1978, D.A. Dean (TAMU 245); 1 ♀, same data except 5 July 1978, D.A. Dean (TAMU 495); 1 ♀, same data except 30 August 1978, D.A. Dean (TAMU 678); 1 ♀, same data except 12 June 1978, D.A. Dean (TAMU 520); 1 ♀, same data except 16 May 1978, W.L. Sterling (TAMU 306); 1 ♂, Wharton Co., 29.3056°N, 96.1737°W, D-Vac cotton, 8 July 1983, D.A. Dean (TAMU). *Virginia*: 1 ♀, Amherst Co., Geo. Washington National Forest, 37.5434°N, 79.1032°W, 21 June 1982, G.B. Edwards (FSCA); 3 ♂, 12 ♀, Arlington Co., Arlington, 38.8751°N, 77.1001°W, July 1956, K.V. Krombein (USNM 2074581); 3 ♂, 1 juvenile, Craig Co., Potts Mountain, 37.4936°N, 80.1805°W, 3 July 1946, H.K. Wallace 1212A (FSCA); 1 ♂, Fairfax Co., Falls Church, 38.8400°N, 77.2635°W (AMNH); 3 ♂, 1 juvenile, Giles Co., 37.3566°N, 80.5376°W, 22 June 1946, H.K. Wallace 1196 (FSCA); 2 ♂, same data except Mountain Lake, 3 July 1946, H.K. Wallace 1211A (FSCA); 1 ♂, Goochland Co., 37.7375°N, 77.8987°W, 6 July 1987, H.A. Dean (TAMU); 1 ♂, Hampshire Co., Capon Bridge, 39.3349°N, 78.5661°W, 9 June 1985, J. Coddington, C. Sobrevila (USNM 2074581); 1 ♀, Montgomery Co., Radford, 37.1562°N, 80.3856°W, 7 July 1934, W.J. Gertsch (USNM 2074581); 2 ♀, Page Co., Shenandoah National Park, E. of Luray, 38.6635°N, 78.3720°W, 5 July (AMNH); 3 ♂, same data except 38.4512°N, 78.5150°W, 14 June 1982, H. Goulet (CNC); 1 ♀, 1 penultimate ♀, Prince Edward Co., Hampden Sydney, 37.2593°N, 78.4300°W, 20 June 1982, G.B. Edwards (FSCA); 1 ♀, same data except Rice, 37.0277931°N, 78.289494°W, on purple *Buddleia*, 27 August 2012, M. Green (FSCA); 1 ♀, Randolph Co., Spruce Knob Lake, 38.8093°N, 80.0088°W, 17 July 1988, G.F. & J.F. Hevel (USNM 2074581); 17 ♀, Smyth Co., Marion, 36.8517°N, 81.5454°W, 6 July 1934, Gertsch (AMNH). *Washington, D.C.*: 1 ♀, 38.9072°N, 77.0369°W, 1956–1957, J. Dante (CAS 9068473). *Wisconsin*: 1 ♂, Dane Co., Madison, 43.0788°N, 89.4027°W, 17 November 1962, Baerwald (UTA 1700); 1 ♀, same data except Univ. Wisc. campus, 20 November 1967, S. Hunsaker (UTA 7703); 1 ♀, Iowa Co., 42.9933°N, 90.1429, T8N, R5E, S9S W1/4, 12 October 1995, S. Delaney (UTA 1692); 1 ♀, Kenosha Co., Kenosha, 42.5602°N, 87.9975°W, 12 June 1970, J. Litsinger (UTA 53027); 1 ♂, Walworth Co., Lake Geneva, Williams Bay, 42.6307°N, 88.5260°W, 5 July 1949, D.C. Lowrie (FMNH); 1 ♂, same data except Wychwood, 29 June 1938, D.C. Lowrie (FMNH). *West Virginia*: 1 ♂, Raleigh Co., 37.7672°N, 81.2519°W, 8 July 1987, H.A. Dean (TAMU); 1 ♂, Wayne Co., 38.2077°N, 82.4573°W, 10 June 1987, H.A. Dean (TAMU).

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 11:00–12:30 (330–15 degrees), with a median of about 12:00 (Fig. 3a). Females can be distinguished in cleared ventral view by the minute conical median coupling pocket with an outline shape of an equilateral triangle (approximately as long as wide) (Fig. 3h).

Description.—*Female*: BL = 5.08 (4.45–6.01), CL = 2.17 (1.76–2.44), CW = 2.25 (1.90–2.63), EGW = 1.08 (0.94–1.21). General appearance as in genus description. Typical females light green in color when alive (Fig. 2a), without any markings. Newly preserved female specimens white, but

long-preserved specimens have carapace as in male. Eye group with pigment divided by diagonal gray stripe between AME and ALE, closer to AME, that curves dorsally over AME, nearly joining medially and isolating AME; another gray line between ALE and PME connected to curved line (Fig. 3j). Epigyne with scape, variable in ventral and posterior aspect, and in length, ranging from about 2.5 x longer than wide (Fig. 3f) to about 2.5 x wider than long (Fig. 3i); the latter is more prevalent. Scape slightly converging toward its tip (where the coupling pocket is located; Fig. 3i). Copulatory ducts long and convoluted, with median coil or half loop in most medial section of wider part of duct (Fig. 3h).

Male: BL = 2.70 (2.56–2.96), CL = 1.16 (1.13–1.21), CW = 1.25 (1.21–1.32), EGW = 0.70 (0.65–0.75). General appearance as in genus description. Males in life typically with green carapace, green legs III and IV, green femora of legs I and II with distal reddish brown leg bands, and yellow abdomen, with variable amount of yellow brown pigment medially on dorsal abdomen. At its maximum, pigment appears as broad median stripe (Fig. 2c), that seems to define boundaries of weakly sclerotized scutum. Typically long-preserved males have yellowish brown cephalothorax, with distinctive but slightly diffuse pale mark in middle of carapace, the rest of body light yellow to amber, with yellow femora and without other markings except leg banding (Fig. 3d). Embolus base beginning near 12:00 position (range 11:00 to 12:30). Embolus completely encircles tegulum, then continues another 95–110 degrees to tip (Fig. 3a); smaller males typically toward higher end of range of embolus base placement (12:30), therefore have shorter embolus.

Distribution.—Eastern NA from Ontario, Canada on the north to eastern Texas and the northern two-thirds of peninsular Florida on the south, with a western border at approximately 98°W longitude, roughly equivalent to the eastern edge of the Great Plains. The distribution given by Lehtinen & Marusik (2008) as “Mexico to southern Canada” is not supported, as the only Mexican record I have seen, from Tamaulipas, is *M. quintero* sp. nov. I also have been unable to corroborate a Guatemala record as reported by the World Spider Catalog (2017), although it is possible that this species extends along the eastern coast of Mexico to eastern parts of Central America. If indeed a *Misumessus*, it is more likely that the Guatemala record represents *M. quintero* sp. nov. as well, as there are verified records of *M. quintero* sp. nov. from eastern Guatemala.

Furthermore, Gertsch (1939) noted that Pickard-Cambridge (1900) mistakenly synonymized *Misumenops pallens* (Keyserling, 1880) with *Misumena americana* (= *M. oblongus*). Combining the information from Gertsch (1939) and Pickard-Cambridge (1900), it is apparent that there were two epigynal forms, one associated with *M. americana*, and one with *M. pallens*, and the Guatemala record matched the *M. pallens* form. Gertsch did not include this record in his distribution of *M. oblongus*. Therefore the Guatemala record of *M. oblongus* is considered erroneous.

Notes.—Sometimes in life, the cephalothorax or the abdomen of *M. oblongus* females is white (e.g., Fig. 2b), but both body sections white together has not been seen. Female green body pigment (becoming white) and male green leg pigment (becoming yellow or white) in preserved specimens

are lost (the green pigment apparently is quickly denatured in alcohol). Gertsch (1939) stated that occasionally there were red [antero-] lateral abdominal bands, but I have only seen yellow anterolateral bands in preserved specimens; this might also be due to denatured pigment. A photo that appears to be of a live female *M. oblongus* from Ohio with a complete red anterior abdominal band was recently posted on iNaturalist, available online at <https://www.inaturalist.org/observations/7239942>

The syntypes of *Misumena oblonga* (males) and *M. americana* (females) are all from the northern central and northeastern United States, so there does not seem to be any question that they are synonymous, and the name *M. americana* is unavailable for another species. Therefore Simon's (1900) identification of *M. americana* from St. Vincent likely was erroneous, and the specimens he saw were probably one of the Antillean species.

Misumessus dicaprio sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:DB790A80-AB2D-4424-AAC2-02E4F928D3F6>

(Fig. 4)

Misumenops (Misumessus) oblongus (Keyserling): Schick, 1965: 7, 108 (in part; misidentification).

Type material.—*Holotype male*. United States: *California*: Riverside County, Riverside, 13 June 1963, D. Miller (CAS).

Other material examined.—UNITED STATES: *Arizona*: 1 ♂, Cochise Co., Chiricahua Mts., South Fork Cave Creek, 31.7513°N, 109.9384°W, 13 June 1958, Alexander (AMNH); 1 ♀, Coconino Co., Grand Canyon, 35.7231°N, 111.8218°W, 24 July 1934, Lutz (AMNH); 7 ♂, same data except Sitgreaves NF, Chevelon Rd Ranger Station, T13N R13E, el. 7000', sweeping yellow blossom clover, 10 June 1969, D.T. Jennings (DMNS 24770); 1 ♀, same data except 11 June 1969, D.T. Jennings (DMNS 24752); 3 ♂, same data except 11 June 1969, D.T. Jennings, DMNS, 24753; 1 ♂, Mohave Co., Yavapai Mt. Park, 35.2787°N, 114.1155°W, el. 5,000', 20 June 1968, L.D. Mikelson (CAS 9068462); Yavapai Co., Prescott, 3 mi. E at Granite Dells, 34.6279°N, 112.3162°W, el. 5,280', 22 June 1968, 1 ♀ L.D. Mikelson (CAS 9068461). *California*: 1 ♀, Fresno Co., Fresno, 8 mi W, 36.7391°N, 119.7007°W, 23 August 1956, R.O. Schuster (AMNH); 1 ♂, Inyo Co., Bishop, 36.5847°N, 117.5806°W, 26 June 1941, W.M. Pearce (AMNH 1012); 2 ♂, 4 ♀, same data except Silver Canyon, 27 June 1941, W.M. Pearce (AMNH 1018); 3 ♂, 2 ♀, Kern Co., Road's End, Kern River, 35.3523°N, 118.6461°W, 3 July 1956, V. Roth, W. Gertsch (AMNH); 1 ♀, Los Angeles Co., Coldbrook Campground, San Gabriel Mts., 33.8004°N, 118.2793°W, riparian woodland, reared, 1962–1963, R.X. Schick 250 (CAS 9053576); 1 ♂, same data except 19 June 1963, R.X. Schick 250 (CAS 9053613); 1 ♀, same data except Coldbrook Campground, 2 mi. N on State Rd 39, San Gabriel Mts., chaparral, reared, 1962–1963, R.X. Schick 246 (CAS 9053630); 1 ♀, same data except San Gabriel Canyon, 14 April–10 June 1958, J.H. Pumphrey (AMNH); 1 ♀, same data except Sunland, 10 August 1951, T. Tice (AMNH); 1 ♀, Mendocino Co., Hopland, 39.3267°N, 123.4891°W, 23 July 1953, W. J. & J. W. Gertsch, AMNH; 8 ♂, 1 ♀, Mono Co., Benton Station, 38.0278°N, 119.1236°W, 10 July 1941, W.M.

Pearce (AMNH 855); 1 juvenile, Monterey Co., Greenfield, 4 mi. W at junction of Greenfield Arroyo Seco and Arroyo Seco Roads, 36.4505°N, 121.4724°W, scrub, reared, 1963–1964, R. X. Schick 307 (CAS 9053540); 1 ♂, same data except Hastings Natural History Res., 36°22'N, 121°33'W, 6 July 1940, J.M. Linsdale (CAS 9053508); 2 ♀, Riverside Co., San Jacinto, 33.7955°N, 116.9617°W, el. 4,600', 1 July 1958, C.P. Alexander (AMNH); 1 ♂, same data except San Jacinto Mts., Herkey Creek, 33.7409°N, 116.2024°W, 20 June 1939, E.S. Ross (CAS 9053545); 4 ♂, 3 ♀, same data except Herkey Creek Camp, 12–23 June 1959, R. Schick, D. Verity (AMNH 117); 3 ♀, San Diego Co., Cleveland Nat. Forest, nr Henshaw Res., 32.9300°N, 116.9509°W, 30 July 1956, V. Roth, W. Gertsch, AMNH; 1 ♀, same data except 5 mi W Lake Henshaw, 15 July 1958, W. J. & J. W. Gertsch (AMNH); 1 ♀, same data except Lakeview District, 20 July 1948 (AMNH 1753); 3 ♀, same data except Pine Valley, 10 July 1953, W. J. & J. W. Gertsch (AMNH); 1 ♂, same data except Santa Ysabel, 1 August 1947, W.M. Pearce (AMNH 1646); 1 ♀, Yolo Co., Davis, 38.6953°N, 121.9051°W, trap in carrot plots, 10 July 1957, E. C. Garlson (AMNH). *Colorado*: 2 ♂, 2 ♀, Delta Co., Cedaredge, 38°53'03"N, 107°55'43"W, el. 6,200', beat sheet *Rhus trilobata*, 3 July 2001, F. Fraser (DMNS 5750); 1 ♂, 1 ♀, Mesa Co., Grand Junction, 39°02'12"N, 108°37'56"W, el. 4,585', beat sheet flowers, 8 August 2001, L. Seidman (DMNS 5152); 1 ♀, Montezuma Co., Mesa Verde Natl. Mon., Mancos River, 37.4169°N, 108.5914°W, 19 July 2001, K. Uziel (DMNS, 6466). *New Mexico*: 1 ♂, Bernalillo Co., Sandia Mountains, nr Albuquerque, 35.0723°N, 106.6064°W, 14 July 1982, C.W. Agnew (TAMU); 1 ♀, Doña Ana Co., Aguirre Springs, 32.4936°N, 106.7252°W, beating manzanita, 17 July 1991, B. Cutler (DMNS 31498); 1 ♂, San Juan Co., Fruitland, 36.7099°N, 108.1336°W, sweeping alfalfa, 23 July 1969, D.C. Heninger (DMNS 23704); 1 ♂, Socorro Co., Magdalena Mts., Cibola NF, Water Canyon Campground, W of Socorro, 34.2041°N, 106.9795°W, el. 6,800', sweeping *Acer negundo*, 25 October 1964, D.T. Jennings (DMNS 23969); 1 ♀, Valencia Co., Manzano Mts., Trigo Cañon, J.F. Kennedy Campground, 34.7200°N, 106.7356°W, beating *Quercus grisea* foliage, 12 September 1975, D.T. Jennings, M.E. Toliver (DMNS 24427). *Texas*: 3 ♂, Presidio Co., Candelario, 29.9529°N, 104.2911°W, on willow, 27 April 2004, A. Knutson, M. Muegge (TAMU 102); 2 ♂, same data except A. Knutson, M. Muegge (TAMU 101.3); 1 ♂, same data except A. Knutson, M. Muegge (TAMU 102.1). *Utah*: 1 ♀, San Juan Co., Bluff, 37.6468°N, 109.7514°W, 5 September 1937, G.F. Knowlton (AMNH); 1 ♂, Washington Co., Hurricane, 4 mi. E on State Hwy 15, 37.2781°N, 113.4208°W, scrub, reared, 1964–1965, R.X. Schick 406 (CAS 9068440); 1 ♂, same data except Zion National Park, scrub, reared, 1964–1965, R.X. Schick 405 (CAS 9068452); 1 ♀, same data except Interstate 15, 6 mi. W Santa Clara, 1964–1965, R.X. Schick 407 (CAS 9068434).

Etymology.—This species is named in honor of Leonardo DiCaprio, for his efforts to raise awareness about global warming.

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 1:00–2:30 (30–75 degrees), with a median of about 2:00 (Fig. 4b). This species is similar to *M. oblongus*

except for the embolus base, which begins farther to the retrolateral side and has less separation from the embolus tip. This species is also similar to *M. blackwalli* sp. nov. in the position of the embolus base, but lacks carapace tubercles, and the embolus is a little longer. Females can be distinguished by having a coupling pocket that is about as wide as or slightly wider than long, proportionately similar to *M. oblongus*, but much smaller in absolute size (about one quarter total volume of coupling pocket of *M. oblongus*) (Fig. 4g).

Description.—*Females*: BL = 5.33 (4.03–6.98), CL = 1.91 (1.69–2.17), CW = 2.01 (1.82–2.32), EGW = 1.04 (0.97–1.12). General appearance as in genus description. In life, females entirely pale green, or abdomen silvery white (Schick 1965). Carapace in preserved specimens brownish with large pale median trapezoidal patch narrowing posteriorly (Fig. 4e). Oblique lines on face between AMEs and ALEs either absent or present as nearly straight lines that converge at the posterior edge of eye group pigment, and may have another line between ALE and oblique line (not reaching AME lens); also a curved line between ALE and PME each side as in *M. oblongus* (Fig. 4f). Some populations have ventral extension of white eye group pigment, but less than occurs in *M. lappi* sp. nov. (Fig. 4f). Scape usually about as wide as long or wider than long, parallel-sided or convex laterally with widest point about mid-length, and posterior end truncate or broadly rounded (Fig. 4i). Copulatory ducts long and convoluted, lacking median coil or half loop in most medial section of wider part of duct; transition to wider part of duct anterior to widest medial section (Figs. 4g, h).

Males: BL = H2.86 (2.69–3.05), CL = H1.22 (1.06–1.30), CW = H1.30 (1.21–1.35), EGW = H0.75 (0.66–0.81). General appearance as in genus description. In life, males have orange-red carapace with green femora, and light green abdomen with white anterolateral bands (Schick 1965). Preserved specimens with carapace as in female; median area of dorsal abdomen pale, but white lateral bands of abdomen visible (Fig. 4a). Embolus base origin in range 1:00–2:30, median 2:00; embolus with complete revolution around tegulum, and additional 60–90 degrees from beginning of embolus base to embolus tip (Fig. 4b).

Distribution.—California, Utah, and western Colorado from the west side of the Rocky Mountains, south and east through Arizona and New Mexico to western Texas, and probably northwest Mexico, as there are several records just on the United States side of the border from Texas to California.

Notes.—The clypeal face pigment appears as a transverse elongate narrow extension of the white pigment extending from the ventral edge of the white eye group pigment (Fig. 4f). This extra pigment extends ventrally little more than half the height of the clypeus, although this is variable. Specimens from the northern part of the range generally lack this extra white pigment, and there are mixed populations with or without extra pigment in northern Arizona. There are also intermediate specimens with some irregular white pigment in the area where a fully-developed extension would be. Schick's (1965) comments would imply that males have a more darkly pigmented carapace than some other species.

It is somewhat surprising that Schick (1965) did not recognize the California populations of this species as

undescribed, but likely this was due to the embolus base position being nearly a continuation of the position variability that occurs in *M. oblongus*, and the difficulty in diagnosing differences in females.

Misumessus tamiami sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank>.

org:act:959C9957-3BF6-4A37-AA52-B6243409DF40

(Fig. 5)

Type material.—*Holotype male*. United States: *Florida*: Sarasota Co., North Port, 27.2051°N, 82.4330°W, on *Spondias mombin*, 25 April 1989, K. Jenkins (FSCA).

Other material examined.—UNITED STATES: *Florida*: 1 ♂, Broward Co., 26.1422°N, 80.2761°W, on a citrus plant, 25 June 1976, P. Karayeanes (FSCA); 1 ♀, same data except on *Citrus sinensis*, 15 July 1980, C. Culbreth (FSCA); 1 ♀, Miami-Dade Co., 25.6480°N, 80.4312°W, on *Cordia sebestena*, 2 April 1984, P. Perum (FSCA); 1 ♀, same data except on *Bucida bucerus*, 6 May 2010, O. Garcia (FSCA); 1 ♀, same data except on hibiscus, 26 September 2006, M. Francois (FSCA); 1 ♀, 1 juvenile, same data except on cypress and roadside weeds, 22 June 1964, K. Stone (FSCA); 1 ♀, same data except along trail in lush hammock, 21 June 1964, K. Stone (FSCA); 1 ♀, same data except on *Quercus* sp., 11 April 2011, M. Hernandez (FSCA); 1 ♀, same data except on *Nerium oleander*, 10 April 2008, M. Hernandez, FSCA; 1 ♀, same data except on *Persea americana*, 26 October 2009 (FSCA); 1 ♀, 3 juveniles, same data except roadside canal banks, heavy cutgrass and ragweed growth, 25 June 1964, K. Stone (FSCA); 1 ♀, same data except 28 December 1940, A. F. Archer (AMNH); 3 ♀, Palm Beach Co., 26.5879°N, 80.2843°W, Royal Palm Park, 5–8 December 1938, Watson, Sanford (AMNH); 1 ♀, Saint Lucie Co., 27.3816°N, 80.3923°W, on *Eupatorium capillifolium*, 18 October 1982, K. Hibbard (FSCA); 1 ♀, same data except on *Persea americana*, 8 September 1982, K. Hibbard (FSCA).

Etymology.—A noun in apposition that is an allusion to the southern peninsular range of this species in south Florida, including along the Tamiami Trail.

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 3:30–4:30 (105–135 degrees) (Fig. 5b). Females can be distinguished by the very wide triangular coupling pocket, which is about twice as wide as long (Fig. 5e).

Description.—*Female*: BL = 5.88 (5.25–7.34), CL = 2.27 (2.12–2.45), CW = 2.39 (2.19–2.53), EGW = 1.08 (1.03–1.12). General appearance as in genus description. Living females apparently light greenish yellow. Preserved specimens with brownish white cephalothorax with nearly square pale mark in middle of carapace (Fig. 5d). Face with oblique gray line lacking, rather AME and ALE connected by narrow, roughly horizontal line from dorsal side of AME to ventral side of ALE (Fig. 5i). There also may be broad gray band between AMEs (Fig. 5i). Epigynal scape short, at least 2 x wider than long, with very wide triangular coupling pocket, about twice as wide as long (Fig. 5e). Posterior end of scape equal to or slightly wider than attachment point. Copulatory ducts long, sinuate section narrow in anterior half, wider part with three tight coils just prior to entering spermathecae (Fig. 5g).

Male: BL = H2.30 (2.18–2.30), CL = H0.99 (0.97–0.99), CW = 1.12 (1.12–1.15), EGW = 0.67 (0.63–0.67). General appearance as in genus description. Carapace color in preserved specimens as in female; abdomen with pale median area surrounded by white pigment (Fig. 5a). Distal segments of palps and legs III and IV with gray pigment. Embolus base in range 3:30–4:30 (105–135 degrees), mean 4:00 (two males); embolus with two complete revolutions around tegulum and a bit more (about 30 degrees) to tip (Fig. 5b). First revolution consists of embolus base plus an extended transitional section that is slightly thicker than filamentous part that completes a little more than another revolution.

Distribution.—Southern peninsular Florida from Sarasota County to St. Lucie County and southward, but not yet recorded from the Florida Keys. Possibly absent from the central ridge, where *M. oblongus* occurs at least as far south as Highlands County, so this may be a species that only occurs in southern coastal and Everglades habitats.

Notes.—For color of live female, see BugGuide image # 873506 of a presumed female of this species from Miami-Dade County, Florida; the image color is accurate per the photographer (Seth Ausubel, pers. comm. 2016).

Misumessus lappi sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:C7BFA4EE-29BA-4BCB-9B47-0A734A312CD2>

(Figs. 6a–f, 7, 8a–c)

Type material.—*Holotype male*. UNITED STATES: *Texas*: Travis Co., Austin, Zilker Nature Preserve, on *Malvaviscus arboreus* var. *drummondii*, 2 July 2011, J. T. Lapp, collected as penultimate, matured 26 July 2011, BugGuide photo # 605882 of adult by J. T. Lapp (FSCA).

Paratypes. United States: *Texas*: 2 ♂, 1 ♀, Travis Co., Austin, 6841 Raccoon Run, shaken from mature live oak, 9 July 2015, J. T. Lapp, collected as penultimates, all matured by 23 July 2015 (FSCA); 1 ♀, Hays Co., Wimberley, EmilyAnn Theatre and Gardens, from Ashe juniper, 13 May 2011, J. T. Lapp, collected as subadult and reared, BugGuide photo # 605893 of adult by J. T. Lapp (FSCA).

Other material examined.—UNITED STATES: *Colorado*: 2 ♂, 1 ♀, El Paso Co., 38°43'22"N, 104°49'36"W, el. 6190', sweep in shortgrass meadow, 27 July 2001, P. E. Cushing (DMNS 5149). *Oklahoma*: 1 ♂, Comanche Co., Fort Sill, West Range, rocky outcrop N. of Man Dam Pond, 34°43'28"N, 98°33'50"W, el. 1560', under rocks, 10 July 2004, P. E. Cushing (DMNS 7093); 1 ♀, Payne Co., Stillwater, 36.1094°N, 96.9690°W, Summer 1931, R.W. Macy (AMNH). *Texas*: 1 ♂, Collingsworth Co., Salt Fork of Red River, N. of Wellington, 34.8559°N, 100.1778°W, 6 July 1939, L.I. Davis (AMNH); 2 ♂, Comanche Co., 32.0789°N, 98.4708°W, fogging in pecan at night, 21 August 2001, A. Calixto, A. Knutson (TAMU); 1 ♂, same data except Comanche, 15 mi NE, 31.9692°N, 98.5313°W, 14 July 1936, Davis (AMNH); 4 ♂, 5 penultimate ♀, 3 juveniles, Dallas Co., Dallas, 32.8972°N, 96.7369°W, 17 July 1936, L.I. Davis (AMNH); 1 ♀, Erath Co., 32.2308°N, 98.2018°W, 12 August 1982, C.W. Agnew (TAMU); 1 ♀, same data except peanuts, 26 August 1981, C.W. Agnew (TAMU 582); 1 ♂, same data except sweeping woods, 11 August 1983, C.W. Agnew (TAMU); 4 ♂, 2 penultimate ♀, same data except mud dauber nest, 30 July

1983, C.W. Agnew (TAMU); 1 ♂, same data except suction trap, 28 July 1983, C.W. Agnew (TAMU); 1 ♂, same data except 7 July 1982, C.W. Agnew (UTA 7704); 1 ♂, Frio Co., 28.9141°N, 99.0511°W, D-Vac cotton, 23 June 1983, D.A. Dean (TAMU); 1 ♂, Hill Co., 31.9768°N, 97.0875°W, D-Vac cotton, 9 August 1983, D.A. Dean, TAMU; 1 ♂, Johnson Co., Alvarado, 32°N, 97°W, 2 September 1933, W. Ivie (AMNH); 1 ♂, Llano Co., 30.7410°N, 98.5398°W, 1 August 1935, L.I. Davis (AMNH); 1 ♂, same data except 10–12 July 1936, L.I. Davis (AMNH); 1 ♂, Robertson Co., 30.748°N, 96.551°W, fogging in pecan at night, 19 September 2001, A. Calixto, A. Knutson (TAMU); 4 ♂, Travis Co., 30°25'58"N, 97°52'01"W, beating trees, 23 July 1994, Dunlap, Quinn, Seale, Woolley (UTA 33733); 10 ♂, same data except 13–14 July 1994, Cate, Dunlap, Quinn, Wharton (TAMU); 13 ♂, same data except 30°27'43"N, 97°52'19"W, 17 July 1993, (TAMU); 1 ♂, same data except Austin, 30.3152°N, 97.7561°W, 7 July 1947, H.E. Frizzell (CAS 9068438); 2 ♂, same data except 30°27'43"N, 97°52'19"W, Long Hollow Creek, 2 August 1993 (TAMU).

Etymology.—This species is named in honor of Joseph T. Lapp of Austin, Texas, who first recognized specimens he collected as a new species, and who provided various types of logistical assistance as well as many of the images used in this revision.

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 7:30–8:30 (225–255 degrees) (Fig. 7e), and in life with paired spots on the abdomen (Figs. 6c–f). Females can be distinguished by the presence of a coupling pocket that is twice as long as wide (Fig. 7h). Both sexes also with distinctive anterior projection in front of AMEs, and AMEs smaller than posterior eyes (Figs. 8a, b).

Description.—*Female*: BL = 6.76 (6.23–7.86), CL = 2.68 (2.19–2.97), CW = 2.59 (2.28–2.79), EGW = 1.21 (1.05–1.30). General appearance as in genus description. Living females white with light green abdomen that has yellow anterolateral bands (Fig. 6b). Preserved females off white with white and/or pink pigment in eye group (Figs. 8a–c). Face with shallow broad anterior projection in front of AMEs, clypeus slightly receding posterior to projection in lateral view (Fig. 8a). AMEs smaller than posterior eyes (Fig. 8a), unique for genus, seemingly correlated with anterior face projection. All eyes, projection, and clypeus below eyes to carapace margin encased in white and/or pink pigment. Eye group with diagonal stripes between AMEs and ALEs extending in a straight line. Scape slightly longer than wide, lobe-like, and slightly convex in all aspects laterally and posteriorly from ventral view (Fig. 7f). Coupling pocket narrow and about twice as long as wide (Fig. 7h). Copulatory ducts with two tight coils or a half loop in anterior part of broader section connecting to spermathecae; first bend in wider part of duct absent, instead duct transition is from a more medial position (Fig. 8j).

Male: BL = H3.48 (3.29–4.15), CL = H1.63 (1.61–1.77), CW = H1.69 (1.61–1.75), EGW = H0.89 (0.83–0.90). General appearance as in genus description. In most living specimens, the carapace is off white in color, and may have a slight reddish tint. Preserved specimens have light brown cephalothorax with pale quadrangular median spot that has short anterior and posterior median extensions. Dorsal abdomen in

living and freshly preserved specimens with double row of paired red spots submedially (Fig. 7a); long preserved specimens lacking spots or with pale remnants of spots present, otherwise abdomen mostly a white mosaic of guanine deposits (Fig. 7b). Embolus base origin in range 7:30–8:30 (225–255 degrees), median at 8:00. Embolus completely encircles tegulum from its point of origin, then about an additional 210–270 degrees (Fig. 7e).

Distribution.—Central Texas from the eastern edge of the Edwards Plateau, northwest to eastern Colorado, on the east side of the Rocky Mountains.

Notes.—Specimens seem to be restricted to trees or to shrubs and other understory plants under trees. Some reared females had white abdomens, but wild caught females and subadult females had a mostly or entirely green abdomen (J. T. Lapp, pers. comm. 2016). Both sexes are variable in color. Females are mostly white, but the abdominal dorsum may be white with green anterolateral bands, pale green with yellow anterolateral bands (Fig. 6b), or simply pale green (Fig. 6a). Possibly the version with yellow bands is the normal color, as penultimate males also are this color (see below). Males have two submedial rows of variably red spots on the abdomen, with the dorsum otherwise off white, although some have the area between the spots red, and one specimen had the abdomen dark green but with darker abdominal spots still visible, and with paler olive green anterolateral abdominal bands, carapace, femora, and hind legs (Figs. 6c–f).

The holotype specimen collected in 2011 no longer has visible spots (see BugGuide photo referenced above that shows these were present at time of maturation, also compare Figs. 6c, d to Fig. 7b). Other specimens collected at earlier dates all lack spots or have only faint pale pigment spots on an otherwise silvery-white dorsum, so it appears that these markings do not persist in alcohol. Also, photos of the holotype male as a penultimate (e.g., BugGuide photo # 605890) show that it lacks spots and has an abdominal color very much like a presumed typical adult female (green with yellow anterolateral bands). Therefore the dark spots only occur in the living and recently preserved adult males.

Misumessus quinteroi sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:AE28A00D-FEAB-4A57-BC7E-DD1E94CDC9F5>

(Figs. 8d–j, 9, 10)

Type material.—*Holotype male*. PANAMA: *Chiriqui*: Puer to Armuellas, 13 July 1981, G. B. Edwards (FSCA).

Paratypes. PANAMA: *Chiriqui*: 2 ♂, same data as holotype (FSCA). *Bocas del Toro*: 1 ♀ (allotype), Changuinola, 1 August 1981, G. B. Edwards (FSCA).

Other material examined.—COSTA RICA: *Cartago*: 1 ♀, Cartago, 9.8638°N, 83.9162°W, 1400–1500 m, 9 August 1975, N.L.H. Krauss (AMNH). *Limón*: 1 ♀, Talamanca Canton of Limón, Cahuita, 9.7348°N, 82.8452°W, 4 August 1981, G.B. Edwards (FSCA); 1 ♂, same data except Sixaola, 4 August 1981 (FSCA). *Puntarenas*: 1 ♀, Golfito, 9.9845°N, 84.8300°W, el. 400 m, 26 July 1981, G.B. Edwards (FSCA). CUBA: *Pinar del Rio*: 1 ♂, Soledad (a barrio in Consolación), 22.4225°N, 83.8490°W, 1–11 August 1934, P.F. Darlington (MCZ 71306). DOMINICA: 1 ♂, Central Reserve, 15.2445°N, 61.2735°W: general sweep, 28 May 2003, L. Bishop (FSCA); 1 ♀, same

data except Freshwater Lake, 2 June 2003, J. Mutti (FSCA); 2 ♀, 1 juvenile ♀, same data except Portsmouth, 15.5562°N, 61.4581°W, el. 0–100 m, July 1979, N.L.H. Krauss (AMNH, in 3 vials); 1 ♀, same data except Tarrou Cliff, beach seagrasses, 30 May 2003, Bishop et al. (FSCA). GRENADA: 1 ♀, Grenville, 12.1243°N, 61.6239°W, 13 September 1967, N.L.H. Krauss (AMNH). GUATEMALA: *Petén*: 1 ♀, Santa Elena, 16.9181°N, 89.8926°W, el. 120–160 m, August 1976, N.L.H. Krauss (AMNH). *Tikal*: 1 ♀, El Petén, 17.2249°N, 89.6110°W, 23–24 September 1959, O. & I. Degener (AMNH). JAMAICA: *Manchester*: 1 ♀, Grove Place, 18.0322°N, 77.5084°W, 15 July 1960, Vauries (AMNH). *St. Ann Parish*: 1 ♀, Discovery Bay, 18.4582°N, 77.3985°W, 20–21 March 1955, A.M. Nadler (AMNH). MEXICO: *Tamaulipas*: 1 ♂, 1 ♀, Tempoal, 1 mi. S, 24.3185°N, 98.8496°W, tropical forest, 18 July 1965, R.X. Schick, D.A. Schroeder (CAS 9068443). MONTserrat: 1 ♀, Plymouth, 16.7065°N, 62.2157°W, el. 100 m, August 1971, N.L.H. Krauss (AMNH); 1 ♀, same data except, 0–200 m, July 1972, N.L.H. Krauss (AMNH). PANAMA: *Canal Zone*: 1 ♀, Madden Dam area, 9.2318°N, 79.5772°W, Jun–July 1960, Lundy (AMNH); 1 ♀, same data except Balboa, 8.9614°N, 79.5632°W, May–June 1960, Lundy (AMNH). PUERTO RICO: 1 ♀, Isla Caja de Muertos, 17.8951°N, 66.5179°W, 24 June 1959, Medina, Martorell (AMNH). ST. VINCENT (W.I.): 1 ♀, Kingstown, 13.1600°N, 61.2248°W, October 1967, N.L.H. Krauss (AMNH); 1 ♀, same data except 1 September 1967, N.L.H. Krauss (AMNH). TRINIDAD & TOBAGO: *Trinidad*: 1 ♂, 1 ♀, 2 juvenile, Tunapuna Piarco, Piarco, 10.6027°N, 61.3327°W, 23 February 1959, A.M. Nadler (AMNH).

Etymology.—This species is named in honor of Diomedes Quintero, Panamanian arachnologist, for his cooperation with ongoing work on Panamanian spiders.

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 9:00–10:30 (270–315 degrees) (Figs. 10c, h). Females can be distinguished by the presence of a coupling pocket that is narrow and about 25% longer than wide, between that of *M. dicaprio* (about as long as wide), and *M. lappi* (about twice as long as wide) (Fig. 8h). The epigynal scape of *M. quinteroi* reaches the greatest separation from the abdomen subdistally. On the face, a horizontal dark line is present between each ALE–AME pair similar to *M. tamiami*, along with a complex branched pale marking on the anterior face of the chelicerae (Figs. 8d, 9b, f, h). Extra face pigment on the clypeus is similar to some specimens of *M. dicaprio*. Tibiae I and II with only 2–3 pairs of ventral macrosetae, other species with 4–5 pairs.

Description.—*Female*: BL = A4.85 (4.85–7.31), CL = A2.17 (2.17–2.39), CW = A2.18 (2.18–2.56), EGW = A1.03 (1.03–1.12). General appearance as in genus description. Preserved specimens with cephalothorax brownish white to medium brown (Figs. 8d, e, 9b, c, f, h), pale quadrangular patch in middle of carapace (Fig. 9c). Chelicerae with pale strongly angulate patches (Figs. 8d, 9b, f, h). Usually with extra face pigment below eyes on clypeus (Figs. 8d, 9b, f, h). Face has strongly curved gray or brown lines nearly isolating all individual eyes except AME, including horizontal lines between each set of ALE and AME connected by curved line below AME, and sometimes dark pigment between the AMEs

(Fig. 9b), but also with a broad curved line between ALE and PME that goes around most of the ALE (Fig. 8d). Eye group pigment white or yellow. Abdomen mostly white to dark yellow dorsally (Figs. 8e, 9c). Abdominal venter broadly white to yellow medially but often with narrow median area defined by double row of pigmented small spots, and area between spots may be filled in with gray pigment, creating a narrow median stripe (Fig. 8f); larger median pale area usually bordered by pale to dark yellowish brown laterally (Figs. 8f, 9d). Ventral tibiae I and II with 2–3 pairs of macrosetae. Epigynal scape unique in reaching greatest separation from body subdistally; posterior end of scape curves slightly back toward body. Widened section of copulatory duet mostly anteromedial to spermatheca with single coil about midway on widest medial part leading directly into spermatheca.

Male: BL = H2.93 (1.93–2.93), CL = H1.25 (0.93–1.29), CW = H1.38 (0.96–1.38), EGW = H0.71 (0.66–0.71). General appearance as in genus description. Preserved males similar to females in color variability. Extraordinarily long spiniforms on legs, abdomen, and two long pairs (S1, A2) near the eye group (Fig. 10a). Proximal tibial and distal femoral leg bands apparently missing, but integument in general is darker than other species, so banding may be obscured. Abdominal venter as in female except black laterally in one male (Fig. 10g). Embolus base origin in range 9:00–10:30 (270–315 degrees), median near 9:00, with complete revolution around tegulum, and additional 150–225 degrees to embolus tip (Figs. 10c, h).

Distribution.—Circum-Caribbean, with continental records from Mexico, Guatemala, Costa Rica, and Panama, and island records from Cuba, Jamaica, Puerto Rico, several islands in the Lesser Antilles, and Trinidad (Trinidad & Tobago). The latter record makes this the only known *Misumessus* species from South America, as Trinidad is a continental island.

Notes.—In very dark individuals, the cheliceral pattern may be hard to see, but the dark color itself is a species indicator.

There is a female specimen of *M. quinteroi* in the AMNH collection with the following two labels [labels separated by semicolon]: 27Bc. N37:W112; Mp.aba. Assuming part of this refers to latitude: longitude, this would place the specimen in Utah, which is highly unlikely unless transported there. If this label interpretation is correct, then the specimen is likely mislabeled.

Misumessus bishopae sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:567B4924-E28C-4E0F-9040-CAB0F0B6F4E7>

(Fig. 11)

Type material.—*Holotype male*. DOMINICA: Springfield Plantation Garden, looking down, 29 May 2003, J. Mutti (FSCA).

Paratypes. DOMINICA: 2 ♂, same data as holotype except 17 May 2003, L. Bishop, A. Moore (FSCA); 1 ♂, Wotten Waven Sulfur Springs, 6 January 2003, Bishop et al. (FSCA).

Other material examined.—DOMINICA: 1 penultimate ♂, Springfield Plantation Garden, beatsheet, 17 May 2003, J. Jamison, J. Mutti (FSCA). PUERTO RICO: 2 ♂, Cayo Norte (off Culebra), 18.2345°N, 66.5935°W, 14 April 1965, H. Heatwole, F. MacKenzie (AMNH). GRENADINES: 1 juvenile ♀ (species uncertain), Bequia, 13.0220°N,

61.2354°W, el. 170 m, cinnamon-garpoan dry scrub, 5 May 2013, Team CarBio (UVT CarBio 075).

Etymology.—This species is named in honor of Leslie Bishop, for the work of her and her students on Dominican spiders.

Diagnosis.—Males can be distinguished from other species of *Misumessus* by the position of the embolus base, which starts in the range 5:00 to 7:30 (180–225 degrees).

Description.—*Male:* BL = H2.18 (2.00–2.28), CL = H1.04 (0.94–1.04), CW = H1.03 (0.94–1.04), EGW = H0.66 (0.61–0.66). General appearance as in genus description. Preserved males with brown cephalothorax and pale pentagonal mark in middle of carapace (Fig. 11a); abdominal dorsum yellow, venter gray. Embolus base origin with median about 6:30, range 5:00 to 7:30 (180–225 degrees), although males at 5:00 and 5:30 are only from Puerto Rico (see Notes).

Distribution.—Puerto Rico, Dominica, Grenadines(?).

Notes.—No females were found that matched with the small males of this species. There is one Dominican female assigned to *M. quinteroi* that has an almost entirely white abdomen, but it also has the cheliceral color pattern, darker narrow median ventral abdominal stripe, and one of the epigynal variations typical for *M. quinteroi* (Figs. 9g, h).

A white juvenile specimen from the Grenadines with pink eye pigment and no cheliceral pattern included here seems more likely to represent this species than *M. quinteroi*. This would suggest that *M. bishopae* is distributed primarily in the Lesser Antilles, but occurring also in Puerto Rico, the easternmost island of the Greater Antilles.

The two Puerto Rico males have a longer embolus base than the Dominican males, starting about 5:00–5:30, but the remainder of the palpal bulb appears to be the same (Fig. 11g). The embolus base of the Dominican males starts at 6:00–7:30 (Fig. 11d). The latter record was an outlier that matched the lower end of the embolus base position range of *M. lappi*, which otherwise is quite different and occurs in the midwestern United States.

Misumessus blackwalli sp. nov.

<http://zoobank.org/?lsid=urn:lsid:zoobank.org:act:D1E01218-839B-4B79-83CA-5F1ADFC65483>

(Fig. 12)

Type material.—*Holotype male*. BERMUDA: 32.3093°N, 64.7503°W, 1 July 1905, T. Kincaid (CAS; only specimen known).

Etymology.—This species is named in honor of John Blackwall, early British pioneer in arachnology and author of the family Salticidae, whose taxonomic concepts and illustrations were far advanced for his time.

Diagnosis.—Male has an embolus base beginning at 2:00, like *M. dicaprioii*. However, this species can be distinguished from other species of *Misumessus* by a pair of small carapace tubercles, the very short RTA base, and filiform abdominal setae.

Description.—*Male holotype:* BL = 2.91, CL = 1.13, CW = 1.22, EGW = 0.75. General appearance as in genus description. Preserved male has brown carapace with pale quadrangular mark in center, legs and abdomen brownish yellow except darker brown leg banding.

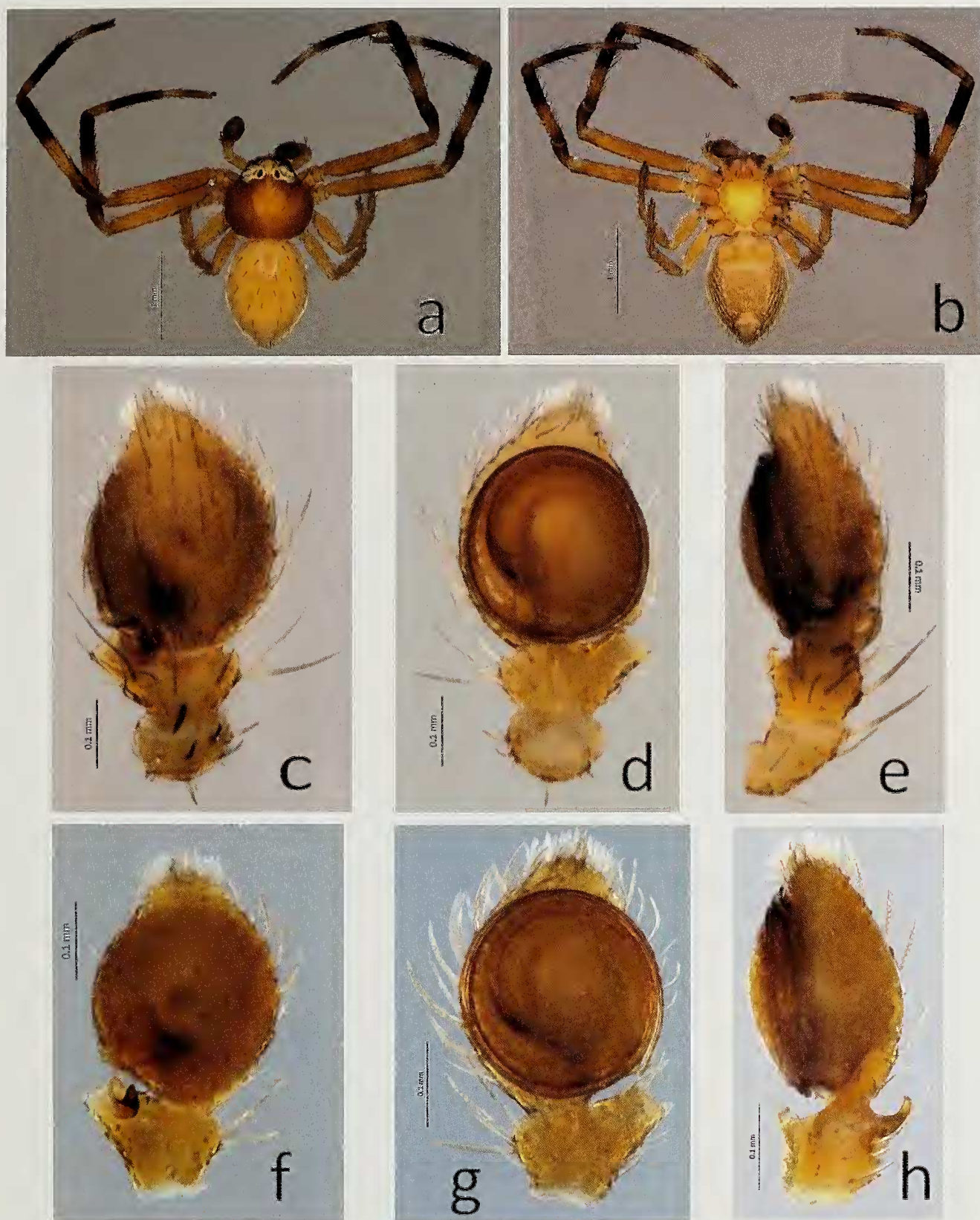


Figure 11.—*Misumessus bishopae* sp. nov. a–e, Holotype male from Dominica: a, dorsum; b, venter; c, dorsal palp; d, ventral palp; e, retrolateral palp. f–h, Male from Puerto Rico: f, dorsal palp; g, ventral palp; h, retrolateral palp.

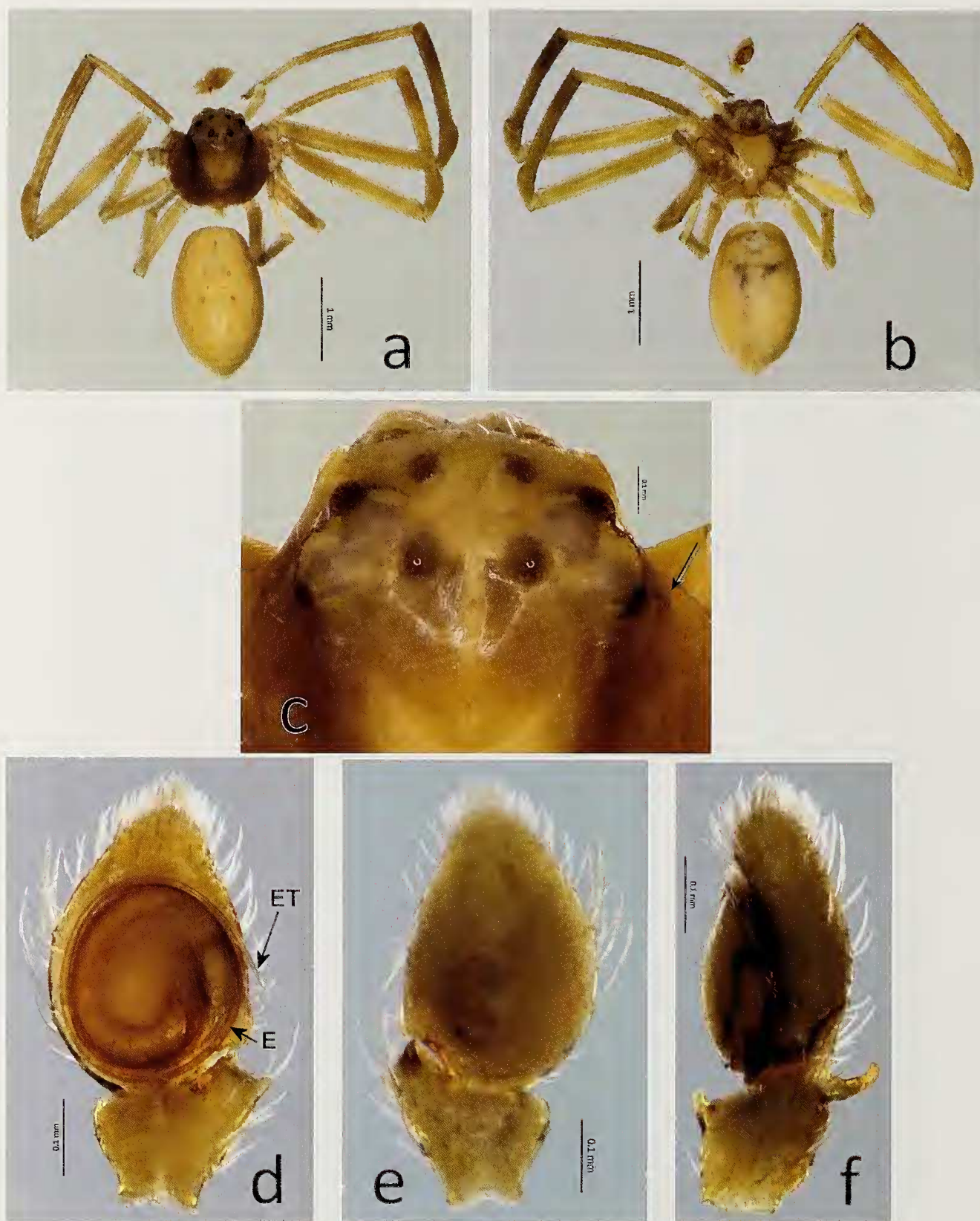


Figure 12.—*Misumessus blackwalli* sp. nov. a-f, Holotype male from Bermuda: a, dorsum; b, venter; c, anterior carapace, arrow to minute tubercle (one each side); d, ventral palp; e, dorsal palp; f, retrolateral palp.

Small tubercle present laterally ventral to eye group on each side (Fig. 12c). RTA with very short base and distally less curled than other species (Fig. 12f). Also, unlike other species, dorsal abdomen has regularly spaced filiform setae rather than spiniform setae, therefore abdominal setae are much less noticeable (Fig. 12a). Embolus base beginning at 2:00, with about 30 degrees more than one revolution around tegulum (Fig. 12d).

Distribution.—Bermuda.

Notes.—Only the right palp is present, so photos of it are mirror-imaged in the figures. The specimen is partially disarticulated, the left anterior leg is missing, and the abdomen is separated from the cephalothorax (Figs. 12a, b).

Thomisus pallens Blackwall, 1868, is the only thomisid species listed from Bermuda (World Spider Catalog 2017). However, the description is of an immature female, gives no characters that would distinguish the species, some previous authors placed it in the quite different genus *Xysticus* (as *X. pallidus*, a lapsus: Simon 1883; Marx 1889), and the type specimen is apparently lost. It is considered a *nomen dubium* by Roewer (1955) and in the World Spider Catalog (2017), and I see no reason to disagree with this assessment. There are at least two characters in the description that suggest it is not a *Misumessus*. Quoting Blackwall (1868: 405), “The eyes, which are dark-coloured, are disposed on the anterior part of the cephalothorax in two transverse curved rows, forming a crescent whose convexity is directed forwards; the four intermediate ones describe a square; and the eyes of each lateral pair are seated obliquely on a conspicuous pale tubercle, the anterior one being the largest of the eight.” The last part of the sentence suggested that the ALEs are the largest eyes, which would be consistent with *Misumessus*, but is also true of some other genera. However, the lateral eyes are indicated as being on discreet pale tubercles, definitely not the situation in *Misumessus*, which has all the eyes enclosed in one contiguous patch of white pigment. Also, the medial eyes in *Misumessus* form a trapezoid, not a square.

Given that Bermuda is near the Gulf Stream and imports a significant portion of its consumables, and potentially any number of species could be introduced there from elsewhere, there is no guarantee that the type specimen of *T. pallens* originated in Bermuda (neither, under the circumstances, is it guaranteed that the present known specimen is native there). Furthermore, the name has not been used since the 19th century except in catalogs and in a checklist as *Thomisus* (*Xysticus*) *pallens* Blackwell [sic] by Verrill (1902: 833), who did not examine a specimen and mentioned it only as reported from Bermuda. Apparently he was aware of the earlier citations of the species, and corrected the spelling of the specific epithet.

In addition to lack of use, there is a potential problem with Blackwall's name. *Misumenops* (*sub Misumena*) *pallens* (Keyserling, 1880) is a potential junior homonym if *Thomisus pallens* were to be transferred to *Misumessus*, as *Misumessus* was formerly considered a subgenus of *Misumenops* (Schick 1965). If *Misumessus* were to be subsumed again within *Misumenops*, which would be possible if future molecular data were to indicate *Misumessus* was embedded within and made *Misumenops* paraphyletic, the homonym would be created. Therefore, for all the above reasons, *Thomisus pallens* Black-

wall, 1868 is designated a *nomen oblitum*, and no longer available.

DISCUSSION

Comparison of *Misumessus* species.—Species of *Misumessus* in males differ from each other by the location of the origin of the embolus. Although there is some intraspecific variation in embolus base placement, which typically approaches the variation ranges of the species that are most similar, the range of variation is quite distinct for each species, with no significant overlap with other species, with one exception. This exception is the embolus origin in the western North American *M. dicaprio* and the Bermudan *M. blackwalli*, which in both begins about 2:00; in other respects the two species are quite different.

Since in some species the length and width of the embolus base appear to be variable, a better species indicator may be the position of a small dark area on the tegulum between the embolus base and the adjacent spermophore (e.g., Fig 5b), that appears to be the place where the spermophore folds back on itself and enters the embolus; in retrolateral view, this area appears contorted (e.g., Fig. 4d). It should be pointed out that differences in the width and length of the embolus base in geographically divided populations in otherwise similar specimens may be indicative of cryptic speciation (e.g., *M. bishopae*, *M. quintero*). However, lacking better evidence, this is considered to be intraspecific variation.

The coupling pocket shape and size appear to be more important than the scape shape, and it is best seen in a cleared epigyne, although usually geographic location and somatic face characters will be sufficient to place female specimens. While *M. quintero* has a clearly distinctive scape shape, the scapes of females of other species have subtle details that are present in most specimens of a particular species, so the apparent variability may be more due to outliers than to a normal condition.

Most species of *Misumessus* have few consistent distinctive somatic structures. The midwestern *M. lappi* has a distinctive projecting face structure along with extensive face pigmentation, including the clypeus, that occurs in both sexes (Figs. 8a–c), and the western *M. dicaprio* has distinctive clypeal pigmentation in its more southerly populations (also in both sexes, Fig. 4f). The neotropical *M. quintero* has mostly darker integument color and a distinctive pale cheliceral pattern (Figs. 8d, 9b, f, h). Known females of other species have distinctive differences in the narrow divisions between eyes (Figs. 3j, 4f, 5i).

The midwestern *M. lappi*, with the most distinctive face, occurs conveniently between and divides the ranges of the more widespread eastern and western USA species of *Misumessus* that are less easy to distinguish somatically. Hypothetically, this unusual face structure may be an isolating mechanism where this species comes into contact with other species. However, it appears that the range of this species is limited, and in Mexico and southward, this division does not exist, as *M. lappi* is not known to range that far south. That does not preclude a geographic separation potentially being maintained for the two other species in Mexico due to the existence of longitudinally-oriented mountain ranges such as the Sierra Madre Oriental. However, neither *M. oblongus* nor

M. dicaprio have been confirmed as occurring in Mexico, although it seems likely, especially in the case of *M. dicaprio*, that both could be found at least a short distance south of the United States/Mexico border. Gertsch (1939) stated that *M. oblongus* was recorded from Mexico, although he does not give a specific locality that might tell us which species was actually recorded. The localities he gave for individual records of *M. oblongus* appear to represent all four of the species now known to occur in the United States.

Regardless, it is apparent that geographic separation is one of the best ways to distinguish species. Species with variation ranges of the embolus origin that approach or coincide at the extremes of their variation with another species are, in most cases, geographically widely separated. The only two species that approach each other both geographically and in palp morphology are *M. oblongus* and *M. quinteroi*, which have quite different somatic appearances.

Even though *M. quinteroi* is the only presently known *Misumessus* species associated with South America, it is possible that there are other misplaced species native to this continent that belong in the genus. For example, South American species with similar-shaped RTAs and approaching the epigynal condition in *Misumessus* do exist (Renato Augusto Teixeira, pers. comm. 2016), such as *Runcinioides litteratus* (Piza, 1933), illustrated by Rinaldi (1988; as *Misumenops litteratus*).

Comparison of North American Misumenini genera.—*Misumessus* can be distinguished from other misumenine thomisids (see Gertsch 1939 for comparative illustrations) of North America (NA) in the female by the greatly reduced epigynal coupling pocket that is displaced posteriorly on a scape whose posterior part projects ventrally, and an abdomen that is significantly longer than wide rather than wider than long. Females lack spiniform setae on the carapace, as is typical of *Misumena* and *Misumenoides* (except for a few that may be present near the eyes, but rarely elsewhere), but lack the anterior carapace carina of the latter genus, and lack the anteriorly-placed epigynal coupling pocket of all other NA genera of Misumenini.

In *Misumessus*, body color in life in females is generally pale green to white; in males the body typically is white or yellow, rarely green, although they may have an amber, orange-red (Schick 1965), or brown (*M. quinteroi*) carapace, and green anterior femora and posterior legs. The predominant color in other NA misumenine females typically is white to yellow, while males are typically white, yellow, or tan in *Mecaphesa* and *Misumenops*, or have a mostly dark (black to dark green) cephalothorax (including appendages) in *Misumena* and *Misumenoides*. However, in life, these are sometimes green or green tinted as well; Lehtinen (2004) considered green on the legs and body to be typical of Misumenini and related tribes. There are no paired dark (usually brown) submarginal stripes (alatal bands; Schick 1965) on the carapace in either sex as occurs in *Mecaphesa* and *Misumenops*, therefore the female usually (except *M. quinteroi*) lacks dark pigmented areas on the carapace, similar to many *Misumena* females (some *Misumena* have faint submarginal bands, and *Misumenoides* females have dark submarginal bands). Neither sex (other than male *M. lappi*) has the paired dark dorsal abdominal

maculations that typically occur in both sexes of *Mecaphesa* and *Misumenops*.

Purely red pigment (not brownish red or orangish red) is absent in most NA Thomisidae, but shows up sporadically in the Misumenini, occurring as red anterolateral bands in some individuals of *Misumena vatia* (Clerck 1757), and in the same position in some *Mecaphesa asperata* (Hentz, 1847) (Dondale & Redner 1978b). Images of several *Mecaphesa* species and *Misumenoides formosipes* on BugGuide show similar markings. Interestingly, as in *Misumessus*, it appears that the only non-misumenines in NA with red pigment on the abdomen also have a green cephalothorax [J.T. Lapp, pers. comm. 2017; see BugGuide images of *Diaea livens* Simon, 1876, and *Synema viridans* (Banks, 1896)]. Gertsch (1939) reported occasional red lateral margins on the abdomen in *Misumessus oblongus*, and *M. lappi* has paired red dorsal abdominal spots in males. So it is possible that red pigment on what as a group are often referred to as 'flower crab spiders' might be a character indicative of the Misumenini and related crab spiders. Ecologically, however, species of *Misumessus*, as the green color suggests, are not flower dwellers, but normally occur on tree and shrub leaves.

Females somatically are difficult to distinguish from *Misumena*, other than by, usually, integument color and the proportional difference in the shape of the abdomen, so it is no wonder that the type species of *Misumessus* was originally described in *Misumena*. Even the relative size of the ALE to AME can be confusing, as in *Misumena vatia*, these eyes are subequal although either can be slightly larger (J.T. Lapp, pers. comm. 2017), whereas in *Misumessus oblongus* (and all other *Misumessus*), the ALE is noticeably larger than the AME. The small weak setae noted by Lehtinen & Marusik (2008) for females does not alone distinguish *Misumessus* from *Misumena* or *Misumenoides*, and is not the situation for *Misumessus* males (not seen by Lehtinen & Marusik 2008).

Despite previous assertions, a close examination of the female genitalia shows that a coupling pocket is present, and it could be interpreted to be a miniature version of what occurs in *Misumenops*. The *Misumenops* coupling pocket is rather flat and opens entirely posteriorly similar to *Misumessus* and *Misumena*, unlike *Mecaphesa* and *Misumenoides*. The main difference is that the *Misumessus* coupling pocket is no longer anterior. Instead, it has been reduced in size, an extension has pushed it posteriorly, and the extension projects a few degrees toward the venter. Lehtinen & Marusik (2008) described this extension as a scape, but also noted that it had been referred to as a 'wide posteriorly-rounded septum' (Kaston 1981). Unlike a typical septum, the scape does not completely divide the atrium containing the copulatory openings, nor is it entirely attached to the integument. Therefore, calling it a scape is appropriate, as it is separated from the rest of the epigyne except for its anterior attachment, but since apparently no previous authors cleared any specimens, they would not have noticed that the coupling pocket is on the dorsal side of the tip of the scape. When cleared, this miniature coupling pocket has a very similar shape to, but is much smaller than, the type of coupling pocket that occurs in *Misumenops bellulus* (Fig. 13c). This revelation, along with male characters summarized below, appears to contradict the statement by Lehtinen &



Figure 13.—*Misumenops bellulus* (Banks, 1896) from Florida. a–b, Male: a, ventral palp, arrows to arch at distal end of embolus base, separating embolus from tegulum; b, retrolateral palp, arrow to distally pointing RTA. c, Female ventral epigyne, black arrow to copulatory duct, white arrow to coupling pocket. Photo credits: a–c by Joe Lapp.

Marusik (2008) that *Misumessus* is not closely related to *Mecaphesa* or *Misumenops*.

As in *Misumenops* and *Misumena*, the eopulatory openings seem to be consistently near and immediately posterior to the lateral edges of the coupling pocket, or in this case, the scape that contains the coupling pocket. The coupling pockets of *Mecaphesa* and *Misumenoides* are so wide that they generally include the copulatory openings within their periphery, and the copulatory openings are situated along the posterior edge of the pocket opening.

From a somatic viewpoint, males hardly seem to belong with females. Except for the lack of carapace submarginal bands and (usually) abdominal markings, they can easily be mistaken for *Mecaphesa* or *Misumenops* males. Even the lack of submarginal bands can be overlooked, as males are often quite small, and the lateral thoracic part of the carapace is sometimes darker than the cephalic and median thoracic parts, so a superficial examination might mistake this pigmentation for bands on the carapace. This darker color, when pronounced (e.g., *Misumessus quintero* and to lesser extent *M. dicaprio*), is reminiscent of *Misumena* and *Misumenoides* males.

Males of *Misumessus* (unlike *Misumessus* females) are like both sexes of *Mecaphesa* and *Misumenops* in having many spiniform setae on the carapace, which was noted cursorily by Gertsch (1939), and by usually having regularly spaced spiniforms on the dorsal abdomen. They also have pigmented bands encircling the front two pair of legs like males of these two genera. *Misumessus* males sometimes seem to have a weakly sclerotized median scutum, also reported for species of *Misumenops* by Lehtinen & Marusik (2008). Clavate setae as occur in *Ozyptila* and relatives are lacking.

Males differ from other NA misumenines by having an embolus that exceeds 360 degrees of rotation around the tegulum and lacks the transitional arch at the distal end of the embolus base that occurs in *Misumena*, *Misumenoides*, *Misumenops*, and some *Mecaphesa* (compare, e.g., Figs 12c, h with Fig. 13a). The other NA genera of Misumenini do not have an embolus that exceeds 180 degrees except some *Mecaphesa*, that are no more than 270 degrees but which also lack the transitional arch. *Misumessus* lacks the strongly curled (spiral) embolus tip and corresponding groove on the distal retrolateral side of the cymbium seen in *Mecaphesa*. The embolus tip has a slight curl like *Misumenops*, and emerges in the same area (between 3:00 and 4:30 on a clock face). This similarity was observed by Gertsch (1939) and the lack of a spiral tip was used in his key to *Misumenops* species (when *Mecaphesa* and *Misumessus* were included in *Misumenops*).

Approximately the distal two-thirds of the RTA is directed dorsally rather than entirely distally as in the other genera [e.g., Fig. 13b; but note that NA misumenines in general have the distal end of the RTA shifted to the dorsal edge rather than being a medial continuation of the base, and in some *Mecaphesa*, the distal part of the RTA tilts dorsally (see Gertsch 1939; as *Misumenops*)]. It is hypothesized that the RTA shape of *Misumessus* co-evolved with the scape in order to accommodate the length of the scape. The recurved tip of the RTA could then reach around the tip of the scape to enter the coupling pocket.

According to Lehtinen & Marusik (2008), the ITA and RTA are separate in *Misumessus*, but completely fused in *Misumenops*. Based on the small retrolateral projection of the RTA, the ITA could be considered neither entirely lacking nor fully developed. However, if this projection represents the ITA, there is minimal development in *Misumessus*. In salticids, such a projection would be considered a prong of the RTA (e.g., Edwards 2015).

Relationships with other misumenine genera are obscure, as can be seen from the above discussion, where there is a mix of characters similar to one or another of the other genera. Lehtinen (2004) redefined the Misumenini and noted that even the common genera have not been properly revised. He gave general characteristics for the tribe, but did not cover all the details of the characters discussed here. Polarity of the states of these characters will need to be determined in order to make sense of the overall phylogeny within the tribe. Some of the characters likely will prove to not be distinctive within the Misumenini.

Pickard-Cambridge (1900) was the first to place *M. oblongus* into his genus *Misumenops*, followed by the catalog of Petrunkevitch (1911), who synonymized *Misumessus*. Gertsch (1939) also followed this placement, but it is clear from his description and discussion of the species that he considered it atypical for the genus. Now that the differences he noted have proven to be consistent for several species, it is clear that they form a distinct clade. The set of unique characters that define the group support the elevation of *Misumessus* by Lehtinen & Marusik (2008) to genus status.

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